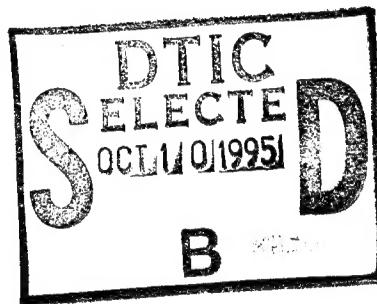




**US Army Corps
of Engineers**
Waterways Experiment
Station

1993 Annual Climatic Summary for the Network for Engineering Monitoring of the Ocean

by Margaret A. Sabol, David D. McGehee



Approved for Public Release; Distribution Is Unlimited

19951006 052

DTIC QUALITY INSPECTED 8

The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.



PRINTED ON RECYCLED PAPER

1993 Annual Climatic Summary for the Network for Engineering Monitoring of the Ocean

by Margaret A. Sabol, David D. McGehee

U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Final report

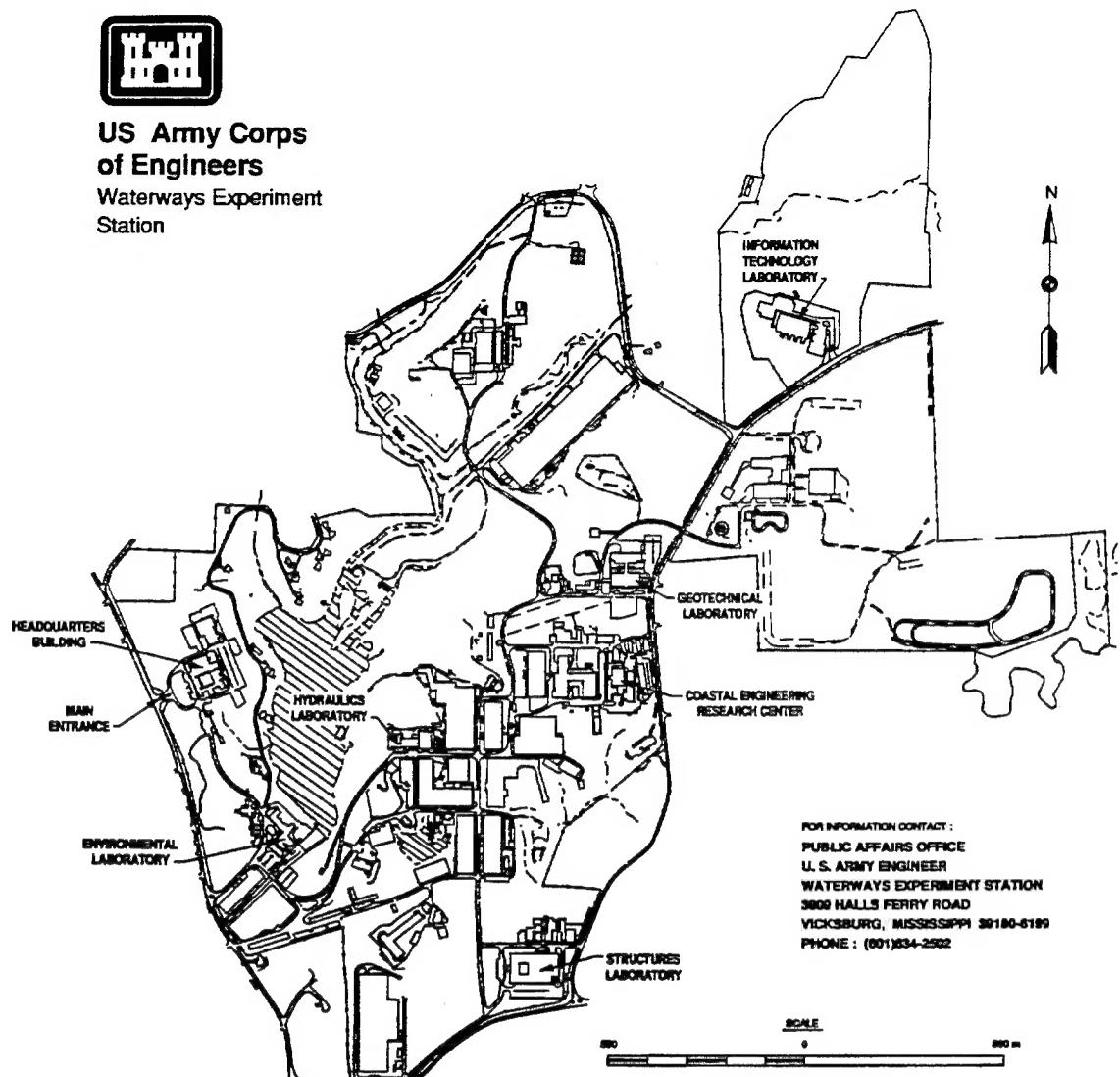
Approved for public release; distribution is unlimited

Prepared for U.S. Army Corps of Engineers
Washington, DC 20314-1000



**US Army Corps
of Engineers**

Waterways Experiment
Station



Waterways Experiment Station Cataloging-in-Publication Data

Sabol, Margaret A.

1993 annual climatic summary for the Network for Engineering Monitoring of the Ocean / by Margaret A. Sabol, David D. McGehee ; prepared for U.S. Army Corps of Engineers..

99 p. : ill. ; 28 cm. — (Miscellaneous paper ; CERC-95-7)

Includes bibliographic references.

1. Ocean waves — United States — Statistics. 2. Water waves — United States — Statistics. 3. Wind waves — United States — Statistics.

I. McGehee, David D. II. United States. Army. Corps of Engineers.

III. U.S. Army Engineer Waterways Experiment Station. IV. Coastal

Engineering Research Center (U.S. Army Engineer Waterways

Experiment Station) V. Title. VI. Series: Miscellaneous paper

(U.S. Army Engineer Waterways Experiment Station) ; CERC-95-7.

TA7 W34m no.CERC-95-7

Contents

Preface	iv
1—Introduction	1
2—Description of Parameters	6
3—Description of Products	9
Description of Data Collection Scheme	9
Number of Records	10
Mean/Max Tables	10
Percent Occurrence Tables	10
Wave Rose Diagrams	11
4—Summary	13
Appendix A: Wave Data for Long Branch, NJ	A1
Appendix B: Wave Data for Dewey Beach, DE	B1
Appendix C: Wave Data for Ocean City, MD	C1
Appendix D: Wave Data for Virginia Beach, VA	D1
Appendix E: Wave Data for Sarasota, FL	E1
Appendix F: Wave Data for Chicago, IL	F1
SF 298	

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
R	

Preface

This report was prepared in the Coastal Engineering Research Center (CERC), U.S. Army Engineer Waterways Experiment Station (WES), and is a product of the Coastal Field Data Collection Program (CFDCP) Field Wave Gaging Program (FWGP). The CFDCP Manager is Ms. Carolyn Holmes. Technical monitor of the CFDCP at Headquarters, U.S. Army Corps of Engineers, is Mr. Jay H. Lockhart, Jr.

The FWGP is administered at CERC by Mr. David McGehee, Manager and Principal Investigator, under the supervision of Mr. William L. Preslan, Chief of the Prototype Measurement and Analysis Branch (PMAB), and Mr. Thomas W. Richardson, Chief, Engineering Development Division. Mr. Charles C. Calhoun, Jr., and Dr. James R. Houston are Assistant Director and Director, respectively, of CERC. Director of WES is Dr. Robert W. Whalin, and Commander is COL Bruce K. Howard, EN.

Wave data presented in this report are obtained from the Network for Engineering Monitoring of the Oceans (NEMO). NEMO is operated by PMAB team members. The content and format of the tables and plots were developed by Mr. William D. Corson, PMAB. This report was prepared by Ms. Margaret Sabol and Mr. David McGehee, PMAB.

The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

1 Introduction

The U.S. Army Corps of Engineers is charged with management of much of our nation's coastal infrastructure. Efficient design, operation, and maintenance of a coastal project require accurate predictions of the expected wave conditions that will provide the dominant loading through its lifetime. Wave measurements are used to establish the required wave climate through statistical analysis of long-term data sets and to calibrate and verify numerical hindcasts. Wave data are also used for validation of other theoretical, numerical, and physical models that are applied to a broad range of coastal engineering applications, such as wave transformation, sediment transport, harbor oscillations, etc. Other Federal and state agencies have missions in resource management, public safety, and economic development that can be enhanced by efficient, timely collection and distribution of wave information.

This report has been prepared by the U.S. Army Engineer Waterways Experiment Station Coastal Engineering Research Center (CERC) as a product of the Field Wave Gaging Program (FWGP). It contains summary information for seven wave gages in operation in 1993 along the U.S. coasts. Five of the gages are along the U.S. Atlantic coast, and names and locations of these gages are shown in Figure 1. Wave roses for locations along the Atlantic coast are shown in Figures A1, B1, C1, and D1. This report also contains summary information for one wave gage located along the gulf coast (Figure 2), and one gage located in Lake Michigan (Figure 3). These gages, which are summarized in Table 1, are part of the Network for Engineering Monitoring of the Oceans (NEMO) operated by the Prototype Measurement and Analysis Branch of CERC.

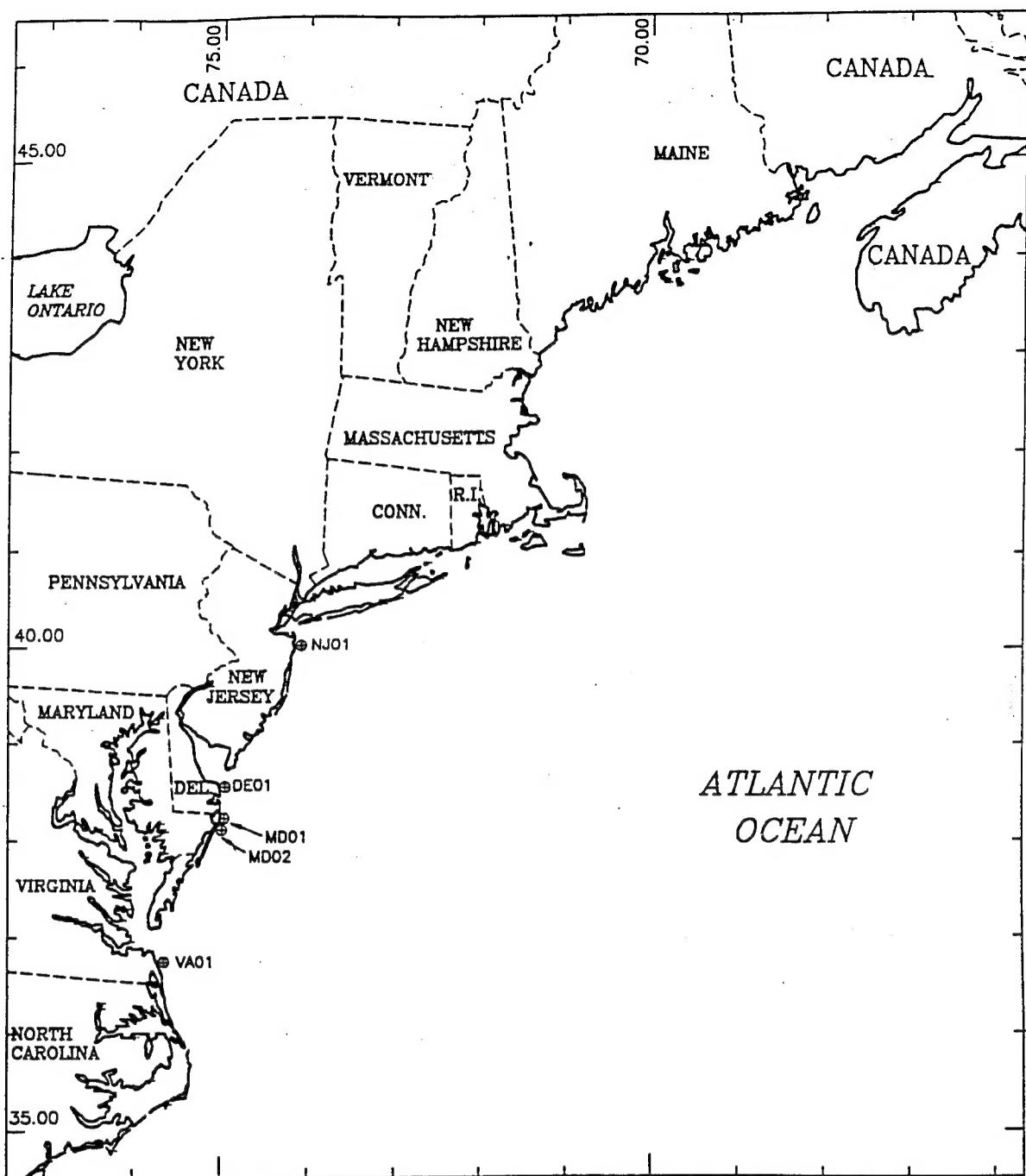


Figure 1. NEMO gages along North Atlantic coast

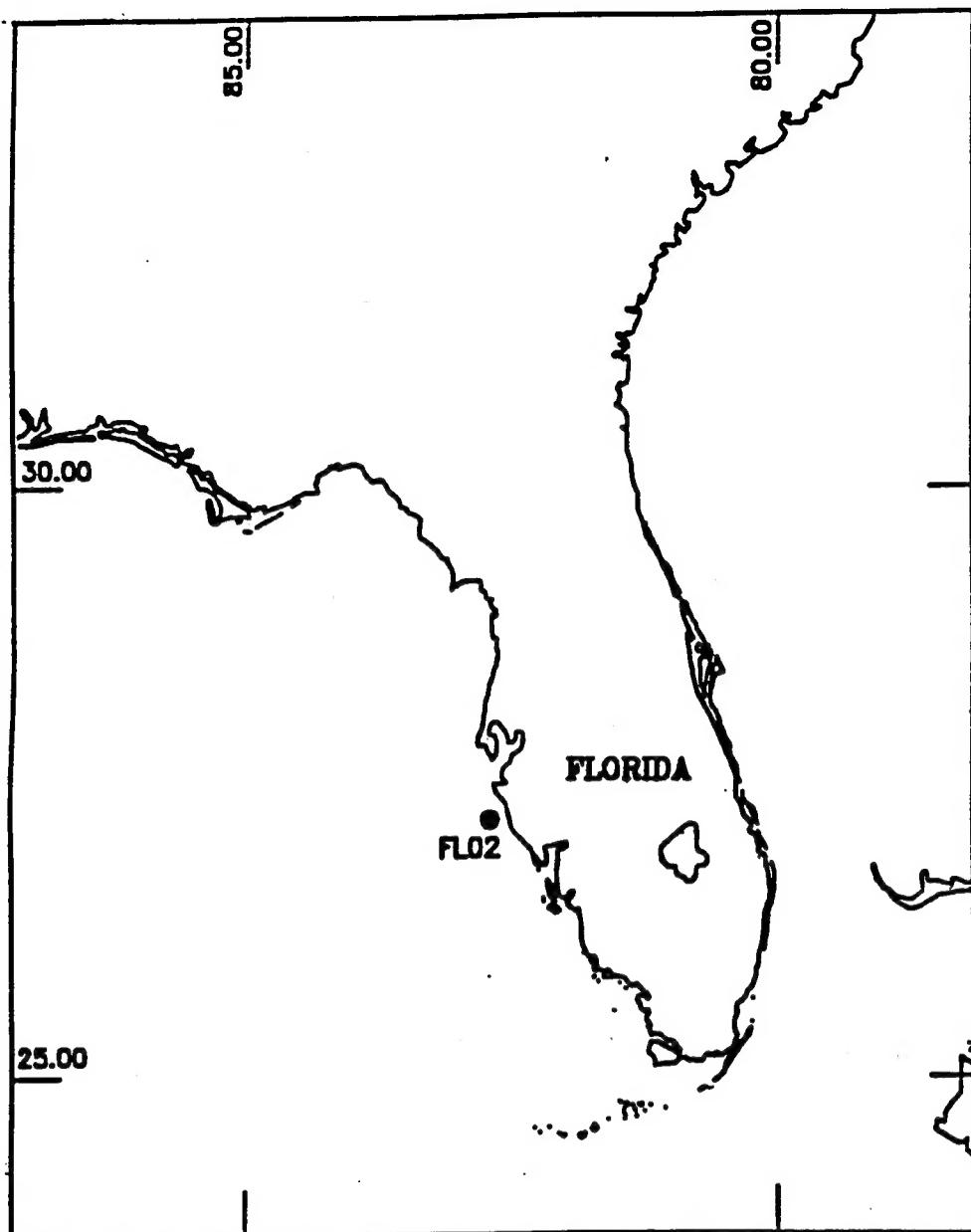


Figure 2. NEMO gage along Florida Gulf Coast

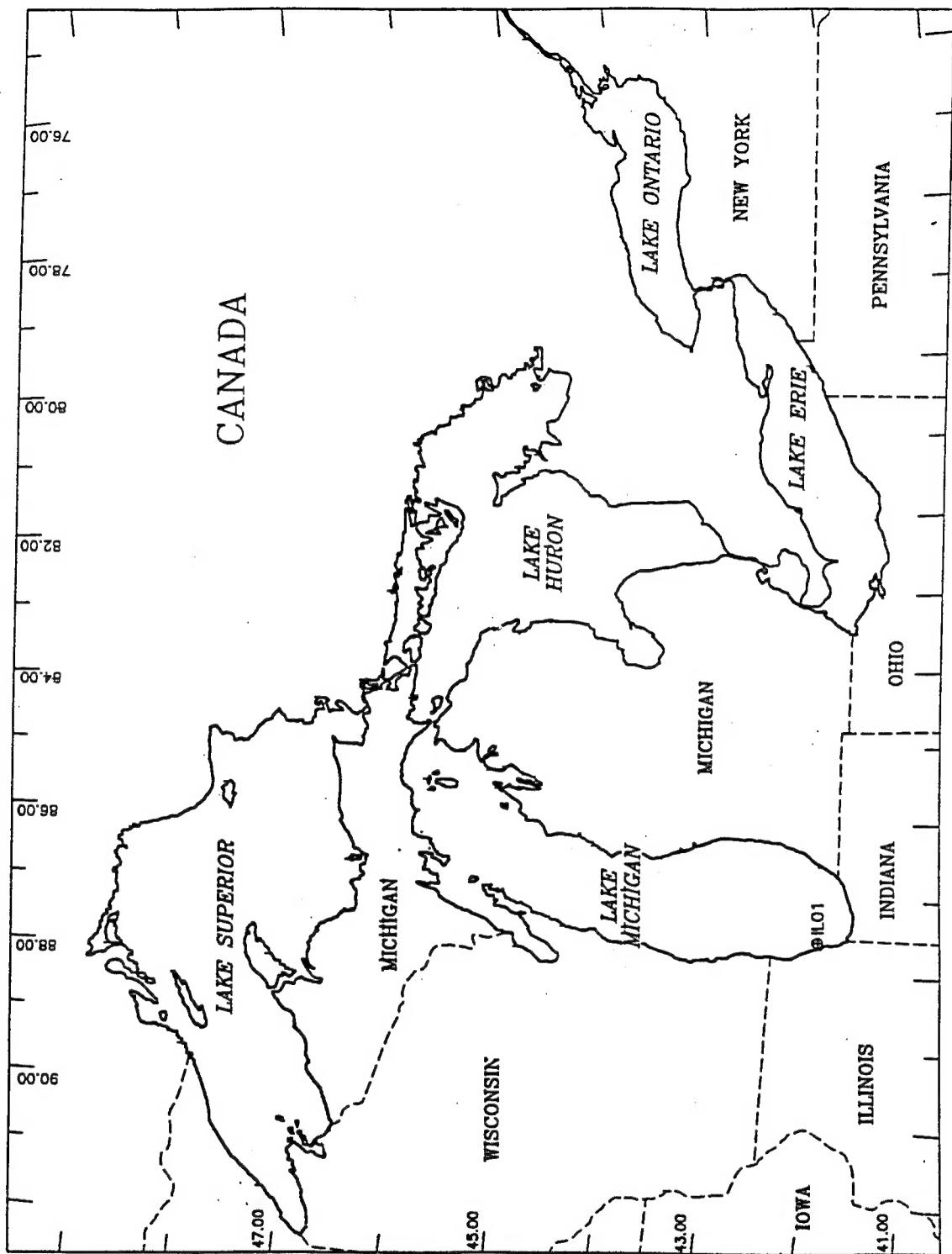


Figure 3. NEMO gage in Great Lakes

Table 1
NEMO Sites Summarized in this Report

Site	Location	Depth, m	Lat/Lon, deg
NJ01	Long Branch, NJ	8	40.30 N 73.97 W
DE01	Dewey Beach, DE	9	38.70 N 75.06 W
MD01	Ocean City, MD	9	38.40 N 75.05 W
MD02	Ocean City, MD	9	38.34 N 75.07 W
VA01	Virginia Beach, VA	8	36.85 N 75.97 W
FL02	Sarasota, FL	7	27.32 N 82.59 W
IL01	Chicago, IL	10	41.92 N 87.57 W

2 Description of Parameters

The standard parameters reported in this document are wave height, period, and direction. These parameters are derived from a two-dimensional power density spectrum of the sea surface using spectral analysis of the sensor's output and linear wave theory. The parameters are defined as follows (see the *Shore Protection Manual*¹ for additional information):

- a. Wave height H_{m0} : Spectrally derived wave height, in meters; equivalent to time-domain-derived significant wave height in deep water.
- b. Wave period T_p : Peak spectral period, in seconds; inverse of the frequency of the peak (highest energy) of the one-dimensional power spectrum. Frequency ranges used in the data analysis are listed in Table 2.
- c. Wave direction D_p : Peak spectral direction, in degrees clockwise from true North; mean direction *from which* energy is coming at the peak of the one-dimensional power spectrum. Ranges for direction intervals are given in Table 3.

Missing data and data that failed to pass quality control tests are excluded from the summaries.

¹ *Shore Protection Manual*. (1984). 4th ed., 2 Vol., U.S. Army Engineer Waterways Experiment Station, U.S. Government Printing Office, Washington, DC.

Table 2
Frequency Ranges Used in Data Analysis

Midband		Band Range for Period, sec	Grouping for Percent Occurrence Tables, sec
Frequency, sec ⁻¹	Period, sec		
0.324	3.1	3.0 ≤ Tp < 3.1	
.	.	.	3.0 - 4.5
0.222	4.5	4.4 ≤ Tp < 4.6	
0.215	4.7	4.6 ≤ Tp < 4.7	
0.207	4.8	4.7 ≤ Tp < 4.9	
0.199	5.0	4.9 ≤ Tp < 5.1	
0.191	5.2	5.1 ≤ Tp < 5.3	
0.184	5.4	5.3 ≤ Tp < 5.6	
0.176	5.7	5.6 ≤ Tp < 5.8	
0.168	6.0	5.8 ≤ Tp < 6.1	
0.160	6.2	6.1 ≤ Tp < 6.4	
0.152	6.6	6.4 ≤ Tp < 6.7	
0.145	6.9	6.7 ≤ Tp < 7.1	
0.137	7.3	7.1 ≤ Tp < 7.5	
0.129	7.8	7.5 ≤ Tp < 7.9	
0.121	8.3	7.9 ≤ Tp < 8.5	
0.113	8.8	8.5 ≤ Tp < 9.1	
0.105	9.5	9.1 ≤ Tp < 9.8	
0.098	10.2	9.8 ≤ Tp < 10.6	
0.090	11.1	10.6 ≤ Tp < 11.5	10.7 - 11.5
0.082	12.2	11.5 ≤ Tp < 12.7	11.6 - 12.7
0.074	13.5	12.7 ≤ Tp < 14.1	12.8 - 14.1
0.066	15.1	14.1 ≤ Tp < 15.9	14.2 - 15.9
0.059	17.1	15.9 ≤ Tp < 18.2	16.0 - 18.2
0.051	19.7	18.2 ≤ Tp < 20.9	
.	.	.	18.3 - longer
0.027	36.6	32.0 ≤ Tp < 40.9	

Table 3
Ranges for Direction Intervals in Percent Occurrence Tables

Midband, Deg ¹	Range, Deg
0.0	$348.75 \leq D_p < 11.25$
22.5	$11.25 \leq D_p < 33.75$
45.0	$33.75 \leq D_p < 56.25$
67.5	$56.25 \leq D_p < 78.75$
90.0	$78.75 \leq D_p < 101.25$
112.5	$101.25 \leq D_p < 123.75$
135.0	$123.75 \leq D_p < 146.25$
157.5	$146.25 \leq D_p < 168.75$
180.0	$168.75 \leq D_p < 191.25$
202.5	$194.25 \leq D_p < 213.75$
225.0	$213.75 \leq D_p < 236.25$
247.5	$236.25 \leq D_p < 258.75$
270.0	$258.75 \leq D_p < 281.25$
292.5	$281.25 \leq D_p < 303.75$
315.0	$303.75 \leq D_p < 326.25$
337.5	$326.25 \leq D_p < 348.75$

¹ From true north.

3 Description of Products

Four types of data summary products are provided in this report:

- a.* Number of records tables.
- b.* Mean/max tables.
- c.* Percent occurrence tables.
- d.* Wave rose plots.

Descriptions and examples of each type of product will be presented in the following sections of the report. Data summary products for Long Branch, NJ, are presented in Tables A1-A3. Tables B1-B3 present summary products for Dewey Beach, DE; Tables C1-C6 contain summary information for Ocean City, MD; data summary products for Virginia Beach, VA, are presented in Tables D1-D3; data summary products for Sarasota, FL, are presented in Tables E1-E3; and summary products for Chicago, IL, are presented in Tables F1-F3.

Description of Data Collection Scheme

Data are collected every 4 hr at all sites. Data are collected hourly during high wave events. High wave events are defined as H_{m0} greater than 1 m for sites in the Great Lakes and West Florida Coast and H_{m0} greater than 1.5 m for sites on the Atlantic Coast. Data may also be collected hourly during special testing or monitoring or by special request from the sponsor.

Number of Records

The number of records tables provide a monthly count of the number of records in each of three categories: records that have an H_{m0} , those that have an H_{m0} and T_p , and those that have an H_{m0} , T_p , and D_p . For this report, all records used have H_{m0} , at least. For data records that have an H_{m0} less than 0.2 m, the T_p and D_p are not reported because the capabilities of the analysis and sensors become limited at extremely low wave heights. Directional data may be missing for any of several reasons. The gage may be nondirectional, the directional data may have been withheld for evaluation, or there may have been a sensor failure on one or two of the three sensors deployed. Data from the third sensor can be used to compute height and period.

There is often a difference in the number of records collected from different sites for a given time period. This may be due to hourly data collection or gage malfunctions.

The number of records table for NJ01, Long Branch, NJ (Table A1) indicates that for June 1993, there are 257 records that have H_{m0} , 256 with H_{m0} and T_p , and 131 records with H_{m0} , T_p , and D_p .

Mean/Max Tables

The mean/max tables indicate mean and maximum H_{m0} by month for the year. A yearly mean H_{m0} is included. Directional bands are centered on 22.5-deg increments such as 0, 22.5, 45, etc. The other annual statistics listed in this table are mean T_p (in seconds), most frequent 22.5-deg direction band (in degrees azimuth), the standard deviation of H_{m0} and T_p , the largest H_{m0} along with its associated T_p , D_p , and the date of the occurrence.

The mean/max table for DE01, Dewey Beach, DE (Table B2) indicates that while the largest mean H_{m0} occurred in February 1993, the largest H_{m0} , 3.8 m, occurred on 4 March 1993 at 1900 hr Universal Coordinate Time (UTC) with an associated T_p of 9.1 sec and D_p of 79 deg.

Percent Occurrence Tables

Percent occurrence tables indicate the percent of the total number of records for a given site that have a specified H_{m0} and T_p . Two types of percent occurrence tables are provided: azimuth tables and tables for all directions. The azimuth tables give the percent occurrence by height and period of waves within a particular azimuth band. Height bands are 0.5-m increments; period bands are 10 uneven increments from below 4.5 sec to

above 18.3 sec (Table 2). Azimuth bands are centered on 22.5-deg increments such as 0, 22.5, 45, etc. (Table 3). All percent values in the azimuth tables are percent times 1,000 to provide for greater readability with preservation of accuracy. Totals of the height category are provided at the right of each height row. Totals for each period range are at the bottom of each period column. Results are in summary form at the bottom of the tables showing the mean H_{m0} and T_p , the largest H_{m0} and the number of cases included in that particular azimuth band. Azimuth tables are provided for all directional wave gage stations.

Calculations for the azimuthal percent occurrence tables used only waves for which direction was determined; i.e., those with H_{m0} greater than 0.2 m. Therefore, for Sarasota and Chicago, where nearly 50 percent of the wave records had H_{m0} less than 0.2 m, these tables give percentages which are considerably greater than if all waves were counted.

Tables that depict heights and period occurrences for all directions together are provided for directional and nondirectional wave gage stations. This table gives the percent (times 100) of waves by height and period without respect to direction and has the same total line and column as the azimuth-based table. The summary line appears at the bottom, with mean H_{m0} and T_p , largest H_{m0} and total number of cases represented by the table.

As an example, determine what percent of the wave records at NJ01, Long Branch, NJ, occur from the 101- to 124-deg azimuth with an H_{m0} of 2.0-2.4 m and a T_p of 8-10.6 sec. The percent occurrence table for that azimuth band (112.5) (Table A3) indicates a value of 290 where the 2.0- to 2.4-m height row intersects with the 8.0- to 10.6-sec period column. Divide this number by 1,000 to get the percent. Thus, 8- to 10.6-sec waves from 2 to 2.4 m would be expected only about 0.29 percent of the time.

Wave Rose Diagrams

The wave rose diagrams indicate mean H_{m0} and the compass direction from which the waves are coming. The scale of the rose is set so the outer edge will be slightly larger than the largest mean wave height for the given wave gage station. Three evenly spaced concentric circles within the rose delineate lesser mean wave heights. The value indicated by the circles is differentiated through the use of distinct line types. The directional bands are centered on 22.5-deg increments such as 0, 22.5, 45, etc. Mean H_{m0} and percent of samples for each direction band are represented in the wedge-shaped portions of the rose plots. The length (or radius) of the wedge describes the mean H_{m0} while the shading of the wedge tells what percent of the samples comes from that direction. Only data records that have a D_p corresponding to an H_{m0} are included in the computation of the means. As with the azimuthal percent occurrence tables, percentages

on the wave rose diagrams are based only on waves with H_{m0} greater than 0.2 m.

The wave rose diagram for VA01, Virginia Beach, VA (Figure D1), indicates a mean H_{m0} of 1.2 m for the azimuth band centered on 67.5 deg and for 1993, more than 15 percent of the D_p values are within the 67.5-deg azimuth band. It also tells at a glance that no waves of any size occurred from the south through the northwest.

4 Summary

The wave data summary products presented in this report are provided to aid in engineering design, assessment, operation, and maintenance of Corps coastal projects. A major thrust of the FWGP is development of standards for climatic summaries that are applicable to all available U.S. wave data. This will allow more comprehensive summaries to be prepared in the future.

Requests for data summarized in the report and other products of the FWGP can be addressed to:

U.S. Army Engineer Waterways Experiment Station
ATTN: CEWES-CD-P (Mr. David McGehee)
3909 Halls Ferry Road
Vicksburg, MS 39180-6199
internet: mcgehee@pmab.wes.army.mil

Appendix A

Wave Data for Long Branch, NJ

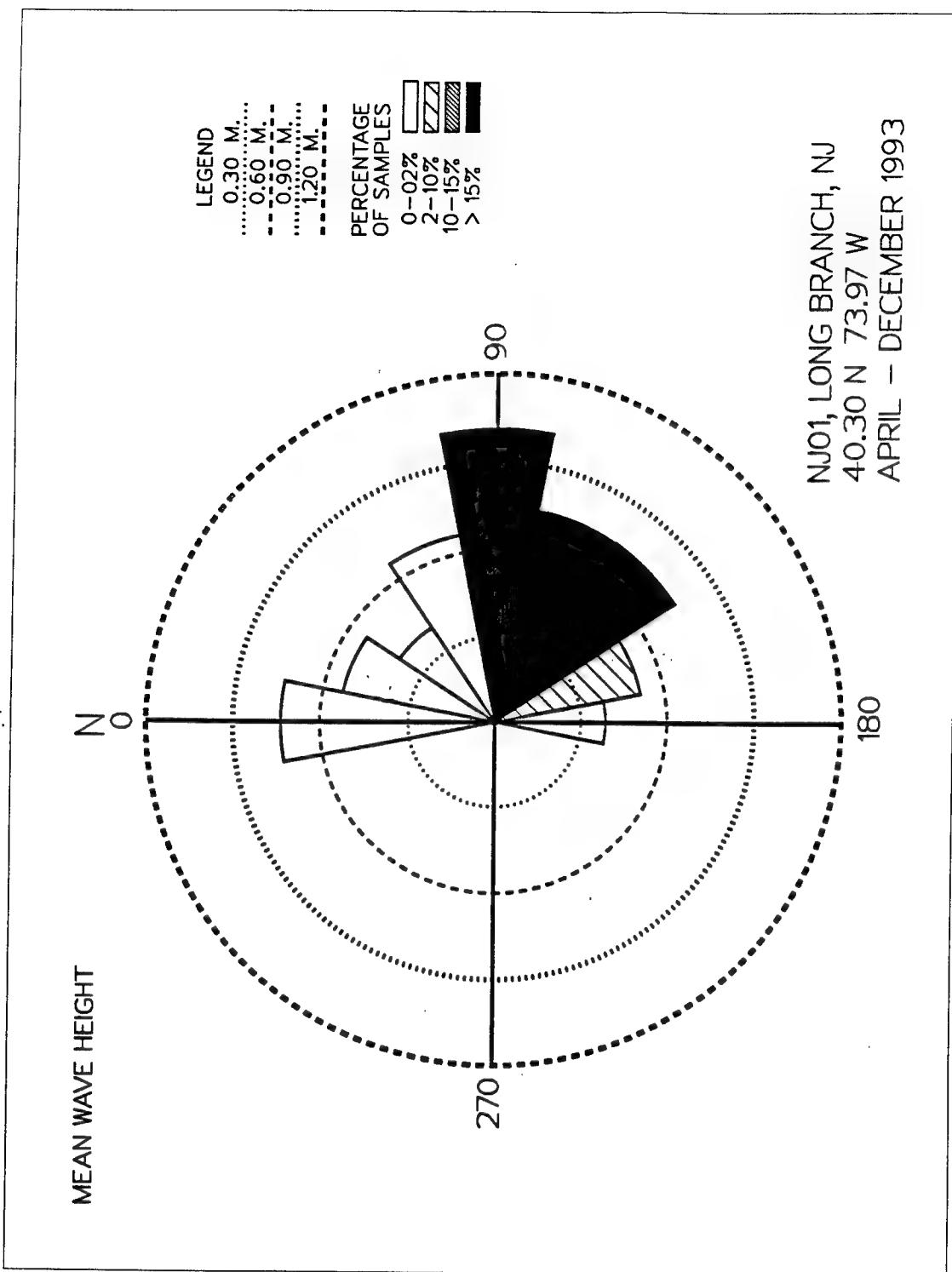


Figure A1. Wave rose, Long Branch, NJ (NJ01)

Table A1
Number of Records for Long Branch, NJ (NJ01)
April - December 1993

NJ01, LONG BRANCH, NEW JERSEY (40.30N 73.97W)

NUMBER OF RECORDS WITH HMO BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	37	186	257	204	238	252	286	258	388	2106

NUMBER OF RECORDS WITH HMO AND Tp BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	36	186	256	191	238	247	286	256	372	2068

NUMBER OF RECORDS WITH HMO, Tp, AND Dp BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	0	0	131	191	238	247	286	256	371	1720

Table A2
Mean/Max Values Long Branch, NJ (NJ01)
April - December 1993

MEAN H_{m0}(METRES) BY MONTH AND YEAR
 NJ01, LONG BRANCH, NJ (40.30N 73.97W)

YEAR 1993	MONTH											MEAN 0.8	
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
	0.5	0.5	0.7	0.7	1.1	1.0	0.7	

LARGEST H_{m0}(METRES) BY MONTH AND YEAR
 NJ01, LONG BRANCH, NJ (40.30N 73.97W)

YEAR 1993	MONTH												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
	0.9	1.6	1.8	2.2	2.4	3.2	2.2	

1 YR. STATISTICS FOR NJ01, LONG BRANCH, NJ (40.30N 73.97W)

THE MEAN SIGNIFICANT WAVE HEIGHT(METRES)=	0.8
THE MEAN PEAK WAVE PERIOD (SECONDS)=	8.0
THE MOST FREQUENT 22.5(CENTER) DIRECTION BAND (DEGREES)=	112.5
THE STANDARD DEVIATION OF H _{m0} (METRES)=	0.5
THE STANDARD DEVIATION OF TP(SECONDS)=	2.2
THE LARGEST H _{m0} (METRES)=	3.2
THE TP(SECONDS)ASSOC. WITH THE LARGEST H _{m0} =	10.7
THE PEAK DIRECTION (DEGREES) ASSOC. WITH THE LARGEST H _{m0} =	126.0
THE DATE OF LARGEST H _{m0} OCCURRENCE IS	93112815

Table A3
Percent Occurrence for Long Branch, NJ (NJ01)
April - December 1993

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) = 0.0
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	LONGER	
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2			
0.2-0.4	58	.	.	.	.	.	.	.	.	.	58
0.5-0.9	.	.	.	.	.	.	.	.	.	.	0
1.0-1.4	58	.	.	.	.	.	.	.	.	.	58
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	116	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.74 LARGEST Hm0(M)= 1.1 MEAN TP(SEC)= 3.8 NO. OF CASES= 2.

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) = 22.5
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	LONGER	
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2			
0.2-0.4	232	.	.	.	.	.	.	.	.	.	232
0.5-0.9	58	.	.	.	.	.	.	.	.	.	58
1.0-1.4	58	.	.	.	.	.	.	.	.	.	58
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	348	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.53 LARGEST Hm0(M)= 1.1 MEAN TP(SEC)= 4.0 NO. OF CASES= 6.

(Sheet 1 of 9)

Table A3 (Continued)

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) = 45.0
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	232	.	.	.	.	.	.	.	.	.	232
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	232	0	0	0	0	0	0	0	0	0	

MEAN Hm0(M) = 0.40 LARGEST Hm0(M)= 0.4 MEAN TP(SEC)= 3.7 NO. OF CASES= 4.

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) = 67.5
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	58	58	.	58	.	58	58	.	.	.	290
0.5-0.9	523	174	58	58	.	.	.	.	.	.	813
1.0-1.4	.	174	.	.	.	.	.	.	.	.	174
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	581	406	58	116	0	58	58	0	0	0	

MEAN Hm0(M) = 0.66 LARGEST Hm0(M)= 1.5 MEAN TP(SEC)= 5.6 NO. OF CASES= 22.

(Sheet 2 of 9)

Table A3 (Continued)

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) = 90.0
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	290	116	1220	2500	232	465	290	232	.	.	5345
0.5-0.9	755	1569	3604	2209	58	58	.	.	.	.	8253
1.0-1.4	.	232	2383	988	58	.	.	.	.	.	3661
1.5-1.9	.	.	2151	872	.	116	.	.	.	.	3139
2.0-2.4	.	.	1569	755	.	.	.	.	.	.	2324
2.5-2.9	.	.	116	58	.	.	.	.	.	.	174
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1045	1917	11043	7382	348	639	290	232	0	0	394.

MEAN Hm0(M) = 1.01 LARGEST Hm0(M)= 2.8 MEAN TP(SEC)= 7.4 NO. OF CASES= 394.

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =112.5
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	116	58	2151	10232	988	755	406	174	.	.	14880
0.5-0.9	232	988	3662	5058	813	755	116	174	.	.	11798
1.0-1.4	.	116	1686	1046	813	639	232	232	.	.	4764
1.5-1.9	.	.	988	1627	290	58	116	.	.	.	3079
2.0-2.4	.	.	232	290	58	58	58	.	.	.	696
2.5-2.9	.	.	58	.	.	116	.	.	.	.	174
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	348	1162	8777	18253	2962	2381	928	580	0	0	609.

MEAN Hm0(M) = 0.75 LARGEST Hm0(M)= 2.8 MEAN TP(SEC)= 8.7 NO. OF CASES= 609.

(Sheet 3 of 9)

Table A3 (Continued)

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =135.0
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	523	232	2558	7151	1279	290	174	116	.	.	12323
0.5-0.9	581	1453	4418	6046	1453	697	523	348	.	.	15519
1.0-1.4	.	406	930	639	.	697	465	58	.	.	3195
1.5-1.9	.	116	639	988	174	174	58	.	.	.	2149
2.0-2.4	.	.	348	465	58	58	.	.	.	.	929
2.5-2.9	.	.	116	116	58	.	.	.	.	.	290
3.0-3.4	.	.	.	.	116	.	.	.	.	.	116
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1104	2207	9009	15405	3138	1916	1220	522	0	0	594.

MEAN Hm0(M) = 0.75 LARGEST Hm0(M)= 3.2 MEAN TP(SEC)= 8.5 NO. OF CASES= 594.

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =157.5
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	1453	523	348	.	.	.	.	.	.	.	2324
0.5-0.9	930	1220	406	.	.	.	.	.	.	.	2556
1.0-1.4	.	58	.	.	.	.	.	.	.	.	58
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	2383	1801	754	0	0	0	0	0	0	0	85.

MEAN Hm0(M) = 0.52 LARGEST Hm0(M)= 1.0 MEAN TP(SEC)= 4.6 NO. OF CASES= 85.

(Sheet 4 of 9)

Table A3 (Continued)

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =180.0
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	232	.	.	.	.	.	.	.	.	.	232
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	232	0	0	0	0	0	0	0	0	0	

MEAN Hm0(M) = 0.39 LARGEST Hm0(M)= 0.4 MEAN TP(SEC)= 3.9 NO. OF CASES= 4.

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =202.5
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 5 of 9)

Table A3 (Continued)

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =225.0
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =247.5
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 6 of 9)

Table A3 (Continued)

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =270.0
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER		
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =292.5
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER		
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 7 of 9)

Table A3 (Continued)

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =315.0
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

LONG BRANCH, NEW JERSEY 40.30N 73.97W AZIMUTH(DEGREES) =337.5
 APRIL - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 8 of 9)

Table A3 (Continued)

		40.30N 73.97W IRRESPECTIVE OF DIRECTION APRIL - DECEMBER 1993 PERCENT OCCURRENCE(X100) OF HEIGHT AND PERIOD										
HEIGHT(METRES)		PEAK PERIOD(SECONDS)										TOTAL
		<4.5	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
		5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2			
0.2-0.4	308	94	873	1980	227	151	80	71	.	.	.	3784
0.5-0.9	303	522	1277	1324	227	123	52	42	.	.	.	3870
1.0-1.4	9	90	451	261	71	109	56	23	.	.	.	1070
1.5-1.9	.	9	313	294	37	28	14	.	.	.	.	695
2.0-2.4	.	.	175	123	9	9	4	.	.	.	.	320
2.5-2.9	.	.	23	14	4	9	.	.	.	.	.	50
3.0-3.4	.	.	.	.	9	.	.	.	.	.	.	9
3.5-3.9	.	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	.	0
TOTAL		620	715	3112	3996	584	429	206	136	0	0	180.
COUNT OF Hm0 LESS THAN .2 M=		38.										PERCENT(X100) OF Hm0 LESS THAN .2 M= 180.
MEAN Hm0(H)=	0.7	LARGEST Hm0(M)=	3.2	MEAN TP(SEC)=	7.8	TOTAL CASES=	2106.					

(Sheet 9 of 9)

Appendix B

Wave Data for Dewey Beach, DE

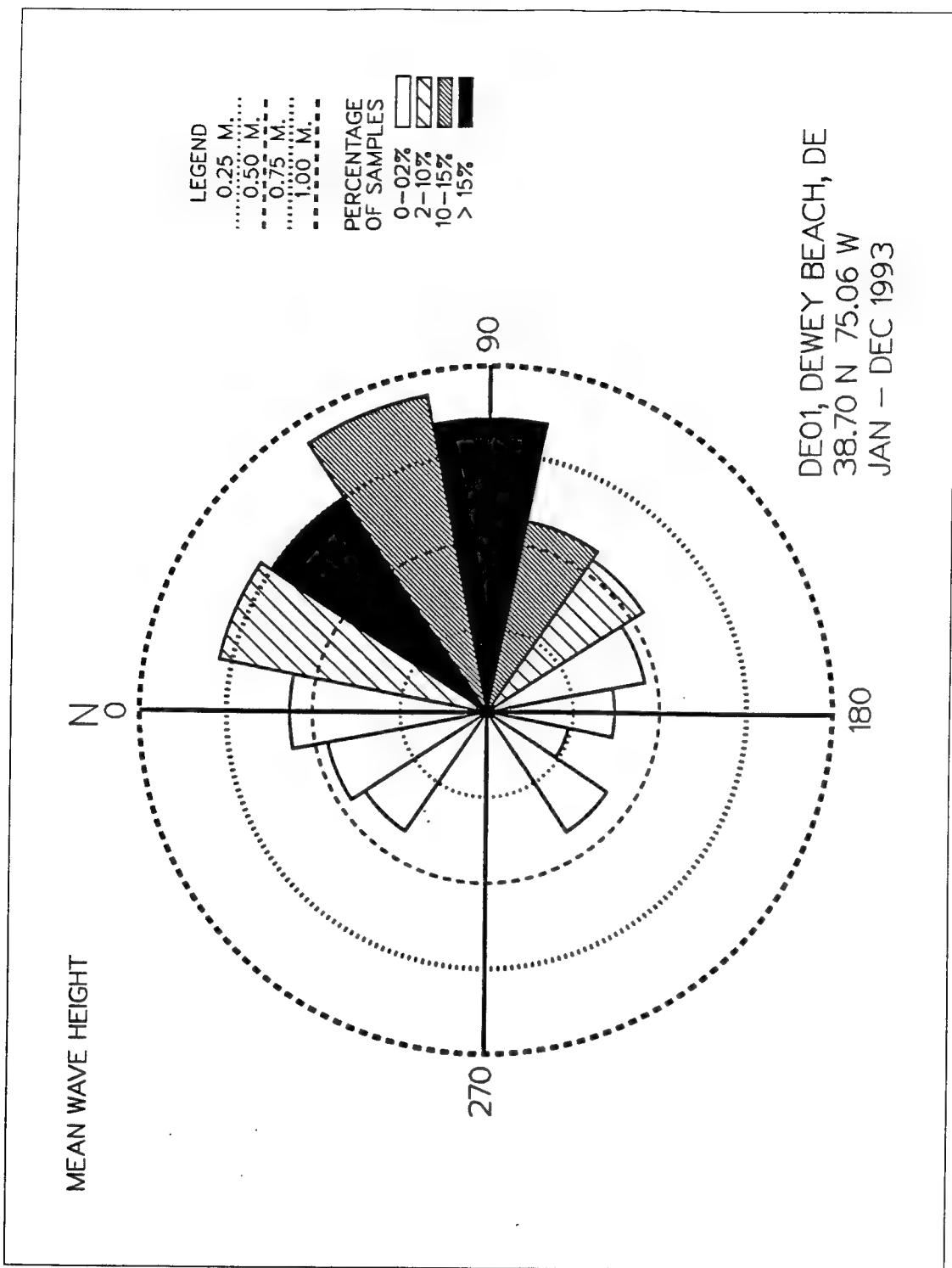


Figure B1. Wave rose, Dewey Beach, DE (DE01)

Table B1
Number of Records for Dewey Beach, DE (DE01)
January - December 1993

DE01, DEWEY BEACH, DE **(38.70N 75.06W)**

(38.70N 75.06W)

NUMBER OF RECORDS WITH HMO BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
234	310	323	223	186	175	186	172	194	212	239	385	2839

NUMBER OF RECORDS WITH HMO AND TP BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
229	310	323	223	186	175	185	172	193	212	234	376	2818

NUMBER OF RECORDS WITH MM0, TR, AND DD BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
229	310	323	223	186	175	185	172	193	212	234	376	2818

Table B2
Mean/Max Values Dewey Beach, DE (DE01)
January - December 1993

MEAN H_{m0}(METRES) BY MONTH AND YEAR
DE01, DEWEY BEACH, DE (38.70N 75.06W)

YEAR	MONTH												MEAN
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1993	1.0	1.1	1.0	1.0	0.5	0.5	0.4	0.6	0.6	0.7	0.8	0.7	0.8

LARGEST H_{m0}(METRES) BY MONTH AND YEAR
DE01, DEWEY BEACH, DE (38.70N 75.06W)

YEAR	MONTH											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1993	2.8	3.0	3.8	2.6	1.3	0.9	1.0	2.1	1.3	2.1	2.3	2.0

1 YR. STATISTICS FOR DE01, DEWEY BEACH, DE (38.70N 75.06W)

THE MEAN SIGNIFICANT WAVE HEIGHT(METRES)=	0.8
THE MEAN PEAK WAVE PERIOD (SECONDS)=	8.5
THE MOST FREQUENT 22.5(CENTER) DIRECTION BAND (DEGREES)=	90.0
THE STANDARD DEVIATION OF H _{m0} (METRES)=	0.5
THE STANDARD DEVIATION OF TP(SECONDS)=	2.9
THE LARGEST H _{m0} (METRES)=	3.8
THE TP(SECONDS)ASSOC. WITH THE LARGEST H _{m0} =	9.1
THE PEAK DIRECTION (DEGREES) ASSOC. WITH THE LARGEST H _{m0} =	79.0
THE DATE OF LARGEST H _{m0} OCCURRENCE IS	93030419

Table B3
Percent Occurrence for Dewey Beach, DE (DE01)
January - December 1993

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) = 0.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	638	106	35	.	.	35	.	.	.	.	814
0.5-0.9	390	248	35	.	.	.	.	.	.	.	673
1.0-1.4	35	35	.	.	.	.	.	.	.	.	70
1.5-1.9	35	.	35	.	.	.	.	.	.	.	70
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1098	389	105	0	0	35	0	0	0	0	

MEAN H_m0(M) = 0.57 LARGEST H_m0(M)= 1.8 MEAN TP(SEC)= 4.4 NO. OF CASES= 46.

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) = 22.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	1029	212	106	425	248	177	248	35	35	.	2515
0.5-0.9	887	461	496	212	35	106	141	.	.	.	2338
1.0-1.4	177	390	283	.	35	106	.	.	.	.	991
1.5-1.9	.	70	390	248	35	.	.	.	.	.	743
2.0-2.4	35	.	106	.	.	.	.	.	.	.	141
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	2128	1133	1381	885	353	389	389	35	35	0	

MEAN H_m0(M) = 0.79 LARGEST H_m0(M)= 2.3 MEAN TP(SEC)= 6.7 NO. OF CASES= 190.

(Sheet 1 of 9)

Table B3 (Continued)

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) = 45.0

JANUARY - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER		
0.2-0.4	283	106	106	2590	1348	958	922	461	354	.	7128
0.5-0.9	461	212	532	2519	1100	993	851	567	35	.	7270
1.0-1.4	70	283	638	319	248	532	603	35	.	.	2728
1.5-1.9	35	35	390	354	177	461	177	.	.	.	1629
2.0-2.4	.	35	.	70	70	35	.	.	.	.	210
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	849	671	1666	5852	2943	2979	2553	1063	389	0	535.

MEAN Hm0(M) = 0.75 LARGEST Hm0(M)= 2.5 MEAN TP(SEC)= 10.1 NO. OF CASES= 535.

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) = 67.5

JANUARY - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER		
0.2-0.4	425	212	887	1596	603	319	177	319	141	.	4679
0.5-0.9	496	709	1490	1454	212	177	212	70	.	.	4820
1.0-1.4	177	567	674	390	106	.	141	35	.	.	2090
1.5-1.9	35	212	709	319	70	35	.	.	.	.	1380
2.0-2.4	.	70	674	248	35	.	.	.	.	.	1027
2.5-2.9	.	.	141	212	70	.	.	.	.	.	423
3.0-3.4	.	.	.	35	.	.	.	.	.	.	35
3.5-3.9	.	.	.	35	.	.	.	.	.	.	35
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1133	1770	4610	4254	1096	531	530	424	141	0	409.

MEAN Hm0(M) = 0.93 LARGEST Hm0(M)= 3.5 MEAN TP(SEC)= 7.8 NO. OF CASES= 409.

(Sheet 2 of 9)

Table B3 (Continued)

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) = 90.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)												TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	LONGER		
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2					
0.2-0.4	532	212	1596	5784	1064	1242	1100	567	35	.	.	12132	
0.5-0.9	567	1100	2838	5074	1916	1490	851	851	.	.	.	14687	
1.0-1.4	106	177	638	1348	922	567	177	248	.	.	.	4183	
1.5-1.9	.	35	532	993	532	319	35	177	70	.	.	2693	
2.0-2.4	.	.	319	780	319	70	.	35	.	.	.	1523	
2.5-2.9	.	.	212	461	106	70	.	70	.	.	.	919	
3.0-3.4	.	.	.	141	.	.	.	.	.	.	.	141
3.5-3.9	.	.	.	106	.	.	.	.	.	.	.	106
4.0-4.4	.	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1205	1524	6135	14687	4859	3758	2163	1948	105	0	.		

MEAN Hm0(M) = 0.85 LARGEST Hm0(M)= 3.8 MEAN TP(SEC)= 9.3 NO. OF CASES= 1026.

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) =112.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)												TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	LONGER		
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2					
0.2-0.4	70	141	1776	2413	319	248	141	248	106	35	.	.	5495
0.5-0.9	319	603	2519	1383	283	354	70	106	.	.	.	.	5637
1.0-1.4	70	248	177	106	.	.	.	.	.	.	.	.	601
1.5-1.9	.	.	.	.	.	.	.	35	.	.	.	.	35
2.0-2.4	.	.	.	.	.	.	.	35	.	.	.	.	35
2.5-2.9	.	.	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	.	.	0
TOTAL	459	992	4470	3902	602	602	211	424	106	35	.	.	

MEAN Hm0(M) = 0.57 LARGEST Hm0(M)= 2.2 MEAN TP(SEC)= 8.1 NO. OF CASES= 333.

(Sheet 3 of 9)

Table B3 (Continued)

DE01, DEWEY BEACH, DE 38.70W 75.06W AZIMUTH(DEGREES) =135.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	461	461	1312	496	70	70	141	35	.	.	3046
0.5-0.9	1383	958	887	35	.	.	.	.	.	.	3263
1.0-1.4	.	141	35	.	.	.	.	.	.	.	176
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1844	1560	2234	531	70	70	141	35	0	0	183.

MEAN Hm0(M) = 0.54 LARGEST Hm0(M)= 1.3 MEAN TP(SEC)= 5.8 NO. OF CASES= 183.

DE01, DEWEY BEACH, DE 38.70W 75.06W AZIMUTH(DEGREES) =157.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	319	35	177	177	35	.	70	.	.	.	813
0.5-0.9	461	.	.	.	.	.	.	.	.	.	461
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	780	35	177	177	35	0	70	0	0	0	36.

MEAN Hm0(M) = 0.47 LARGEST Hm0(M)= 0.9 MEAN TP(SEC)= 5.6 NO. OF CASES= 36.

(Sheet 4 of 9)

Table B3 (Continued)

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) =180.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	.	.	.	35	.	.	.	35	.	.	70
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	35	0	0	0	35	0	0	

MEAN Hm0(M) = 0.37 LARGEST Hm0(M)= 0.4 MEAN TP(SEC)= 11.4 NO. OF CASES= 2.

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) =202.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	35	.	.	35
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	35	0	0	

MEAN Hm0(M) = 0.24 LARGEST Hm0(M)= 0.2 MEAN TP(SEC)= 14.2 NO. OF CASES= 1.

(Sheet 5 of 9)

Table B3 (Continued)

DE01, DEWEY BEACH, DE 38.70W 75.06W AZIMUTH(DEGREES) =225.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	35	.	.	.	.	35
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	35	0	0	0	0	0

MEAN Hm0(M) = 0.42 LARGEST Hm0(M)= 0.4 MEAN TP(SEC)= 10.7 NO. OF CASES= 1.

DE01, DEWEY BEACH, DE 38.70W 75.06W AZIMUTH(DEGREES) =247.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 6 of 9)

Table B3 (Continued)

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) =270.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2			
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) =292.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2			
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 7 of 9)

Table B3 (Continued)

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) =315.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	283	354	35	.	.	.	.	.	.	.	672
0.5-0.9	106	70	.	.	.	.	.	.	.	.	176
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	389	424	35	0	0	0	0	0	0	0	

MEAN Hm0(M) = 0.42 LARGEST Hm0(M)= 1.0 MEAN TP(SEC)= 4.6 NO. OF CASES= 24.

DE01, DEWEY BEACH, DE 38.70N 75.06W AZIMUTH(DEGREES) =337.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	319	319	70	.	35	.	.	.	.	.	743
0.5-0.9	141	141	70	.	.	.	.	.	.	.	352
1.0-1.4	.	.	35	.	.	.	.	.	.	.	35
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	460	460	175	0	35	0	0	0	0	0	

MEAN Hm0(M) = 0.46 LARGEST Hm0(M)= 1.0 MEAN TP(SEC)= 4.8 NO. OF CASES= 32.

(Sheet 8 of 9)

Table B3 (Continued)

		38.70N 75.06W IRRESPECTIVE OF DIRECTION JANUARY - DECEMBER 1993 PERCENT OCCURRENCE(X100) OF HEIGHT AND PERIOD										
HEIGHT(METRES)		PEAK PERIOD(SECONDS)										TOTAL
		<4.5	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
		5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER		
0.2-0.4	433	214	605	1342	373	302	278	172	66	3	3788	
0.5-0.9	517	447	880	1060	352	309	211	158	3	.	3937	
1.0-1.4	63	183	246	214	130	119	91	31	.	.	1077	
1.5-1.9	10	35	204	190	81	81	21	21	7	.	650	
2.0-2.4	3	10	109	109	42	10	.	7	.	.	290	
2.5-2.9	.	.	35	66	17	7	.	7	.	.	132	
3.0-3.4	.	.	.	17	.	.	.	.	.	.	17	
3.5-3.9	.	.	3	10	.	.	.	.	.	.	13	
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0	
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0	
5.0+	.	.	.	.	.	.	.	.	.	.	0	
TOTAL	1026	889	2082	3008	995	828	601	396	76	3		
COUNT OF Hm0 LESS THAN .2 M=	21.										74.	
MEAN Hm0(M)=	0.8	LARGEST Hm0(M)=	3.8	MEAN TP(SEC)=	8.4	MEAN CASES=	2839.					

(Sheet 9 of 9)

Appendix C

Wave Data for Ocean City, MD

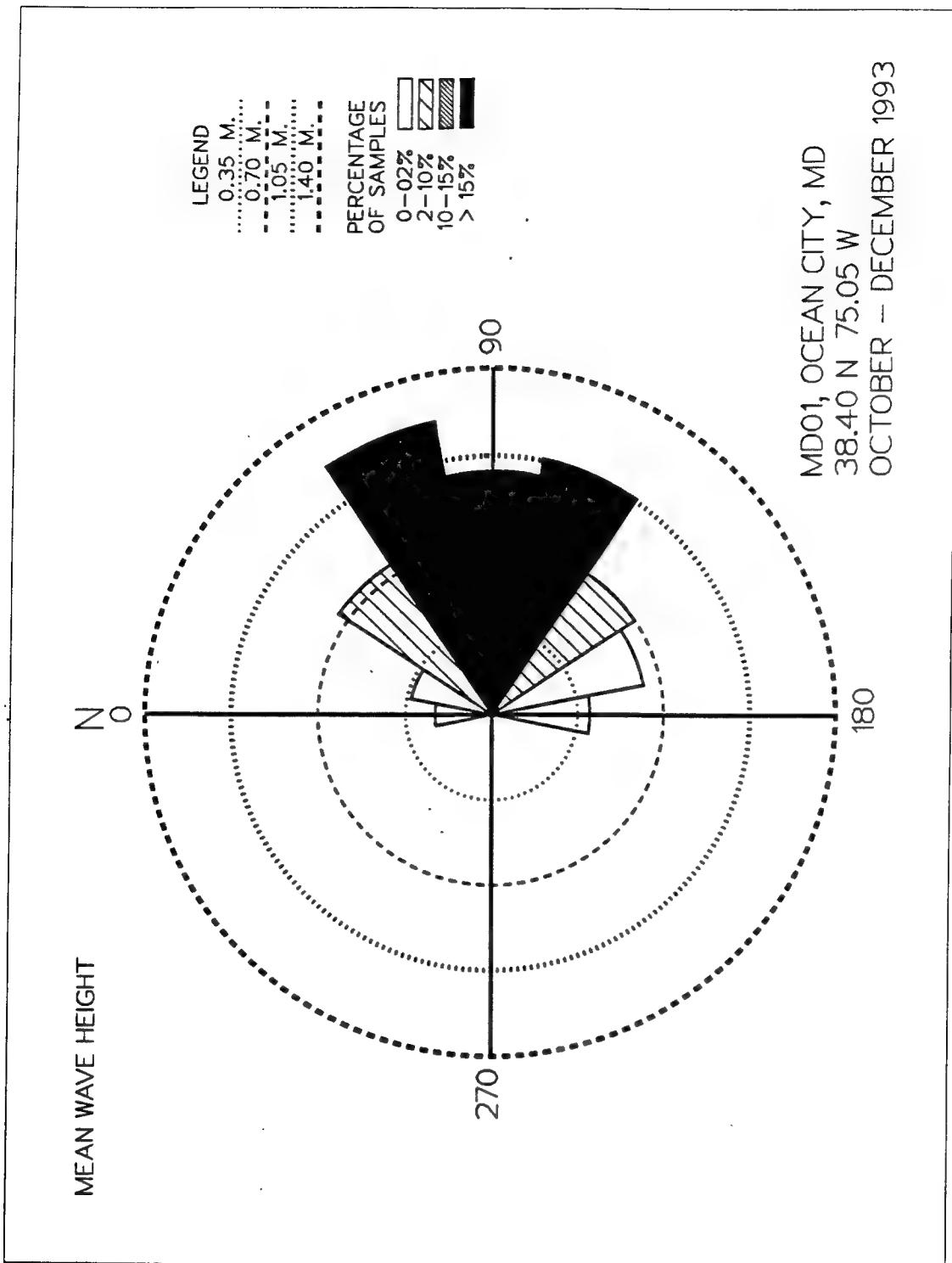


Figure C1. Wave rose, Ocean City, MD (MD01)

Table C1
Number of Records for Ocean City, MD (MD01)

MD01, OCEAN CITY, MD SITE 1 (38.40N 75.05W)

NUMBER OF RECORDS WITH HMO BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	0	0	0	0	0	0	259	271	401	931

NUMBER OF RECORDS WITH HMO AND Tp BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	0	0	0	0	0	0	259	271	400	930

NUMBER OF RECORDS WITH HMO, Tp, AND Dp BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	0	0	0	0	0	0	259	271	400	930

Table C2
Mean/Max Values Ocean City, MD (MD01)
October - December 1993

MEAN H_s0(METRES) BY MONTH AND YEAR
 MD01, OCEAN CITY, MD (38.40N 75.05W)

YEAR 1993	MONTH											MEAN 1.0
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV		DEC
.	1.1	1.2	0.9	.

LARGEST H_s0(METRES) BY MONTH AND YEAR
 MD01, OCEAN CITY, MD (38.40N 75.05W)

YEAR 1993	MONTH											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
.	3.0	3.4	2.5	.

1 YR. STATISTICS FOR MD01, OCEAN CITY, MD (38.40N 75.05W)

THE MEAN SIGNIFICANT WAVE HEIGHT(METRES)=	1.0
THE MEAN PEAK WAVE PERIOD (SECONDS)=	9.3
THE MOST FREQUENT 22.5(CENTER) DIRECTION BAND (DEGREES)=	90.0
THE STANDARD DEVIATION OF H _s 0(METRES)=	0.6
THE STANDARD DEVIATION OF TP(SECONDS)=	2.6
THE LARGEST H _s 0(METRES)=	3.4
THE TP(SECONDS)ASSOC. WITH THE LARGEST H _s 0=	10.7
THE PEAK DIRECTION (DEGREES) ASSOC. WITH THE LARGEST H _s 0=	108.0
THE DATE OF LARGEST H _s 0 OCCURRENCE IS	93112811

Table C3
Percent Occurrence for Ocean City, MD (MD01)
October - December 1993

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) = 0.0 OCTOBER - DECEMBER 1993 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION										
HEIGHT(METRES)	PEAK PERIOD(SECONDS)									TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	
0.2-0.4	107	.	.	.	.	.	.	.	.	107
0.5-0.9	.	.	.	.	.	.	.	.	.	0
1.0-1.4	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	0
TOTAL	107	0	0	0	0	0	0	0	0	1.
MEAN H _{m0} (M) = 0.23 LARGEST H _{m0} (M)= 0.2 MEAN TP(SEC)= 3.7 NO. OF CASES=										1.
MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) = 22.5 OCTOBER - DECEMBER 1993 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION										
HEIGHT(METRES)	PEAK PERIOD(SECONDS)									TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	
0.2-0.4	537	107	.	.	.	.	.	.	.	644
0.5-0.9	.	.	.	.	.	.	.	.	.	0
1.0-1.4	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	0
TOTAL	537	107	0	0	0	0	0	0	0	6.
MEAN H _{m0} (M) = 0.33 LARGEST H _{m0} (M)= 0.4 MEAN TP(SEC)= 4.1 NO. OF CASES=										6.

(Sheet 1 of 9)

Table C3 (Continued)

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) = 45.0
 OCTOBER - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	322	322	.	107	.	.	215	.	.	.	966
0.5-0.9	1182	967	107	.	.	.	.	.	.	.	2256
1.0-1.4	.	107	215	.	.	.	.	.	.	.	322
1.5-1.9	.	107	215	.	.	.	.	.	.	.	322
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1504	1503	537	107	0	0	215	0	0	0	

MEAN Hm0(M) = 0.75 LARGEST Hm0(M)= 1.9 MEAN TP(SEC)= 5.3 NO. OF CASES= 36.

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) = 67.5
 OCTOBER - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	.	107	107	1397	430	107	107	.	.	.	2255
0.5-0.9	537	860	752	1290	967	752	645	.	.	.	5803
1.0-1.4	.	430	1075	1182	752	322	967	322	.	.	5050
1.5-1.9	.	215	1397	967	215	322	537	.	.	.	3653
2.0-2.4	.	.	537	1182	860	322	430	.	.	.	3331
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	537	1612	3868	6018	3224	1825	2686	322	0	0	

MEAN Hm0(M) = 1.21 LARGEST Hm0(M)= 2.5 MEAN TP(SEC)= 9.1 NO. OF CASES= 187.

(Sheet 2 of 9)

Table C3 (Continued)

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) = 90.0
OCTOBER - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	.	.	.	5161	1075	322	430	215	.	.	7203
0.5-0.9	.	322	645	7849	2580	2043	3010	1290	430	.	18169
1.0-1.4	107	215	1720	2258	430	1075	1612	537	.	.	7954
1.5-1.9	.	.	1935	1612	215	537	322	.	.	.	4621
2.0-2.4	.	.	430	1505	537	322	215	.	.	.	3009
2.5-2.9	.	.	.	430	.	.	.	.	.	.	430
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	107	537	4730	18815	4837	4299	5589	2042	430	0	385.

MEAN Hm0(M) = 0.99 LARGEST Hm0(M)= 2.8 MEAN TP(SEC)= 10.0 NO. OF CASES= 385.

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) =112.5
OCTOBER - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	.	107	322	2150	107	107	107	.	.	.	2900
0.5-0.9	215	107	860	8709	1827	860	430	537	430	.	13975
1.0-1.4	107	.	537	2150	1505	967	215	107	.	.	5588
1.5-1.9	.	.	322	215	.	322	.	.	.	.	859
2.0-2.4	.	.	.	1075	107	107	215	.	.	.	1504
2.5-2.9	.	.	.	322	322	537	537	.	.	.	1718
3.0-3.4	.	.	.	.	215	215	.	.	.	.	430
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	322	214	2041	14621	4083	2793	1826	644	430	0	251.

MEAN Hm0(M) = 1.06 LARGEST Hm0(M)= 3.6 MEAN TP(SEC)= 9.8 NO. OF CASES= 251.

(Sheet 3 of 9)

Table C3 (Continued)

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) =135.0
 OCTOBER - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER		
0.2-0.4	.	107	322	752	.	.	.	.	.	.	1181
0.5-0.9	107	537	1505	967	.	.	.	.	.	.	3116
1.0-1.4	.	.	215	215	.	.	.	.	.	.	430
1.5-1.9	.	.	107	.	.	.	.	.	.	.	107
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	107	644	2149	1934	0	0	0	0	0	0	45.

MEAN Hm0(M) = 0.70 LARGEST Hm0(M)= 1.6 MEAN TP(SEC)= 7.0 NO. OF CASES= 45.

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) =157.5
 OCTOBER - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER		
0.2-0.4	215	215	107	.	.	.	.	.	.	.	537
0.5-0.9	752	430	107	.	.	.	.	.	.	.	1289
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	967	645	214	0	0	0	0	0	0	0	17.

MEAN Hm0(M) = 0.63 LARGEST Hm0(M)= 1.0 MEAN TP(SEC)= 4.6 NO. OF CASES= 17.

(Sheet 4 of 9)

Table C3 (Continued)

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) =180.0
 OCTOBER - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.6-	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	215	.	.	.	.	.	.	.	.	.	215
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	215	0	0	0	0	0	0	0	0	0	

MEAN H_{m0}(M) = 0.40 LARGEST H_{m0}(M)= 0.5 MEAN TP(SEC)= 3.7 NO. OF CASES= 2.

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) =202.5
 OCTOBER - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.6-	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	

MEAN H_{m0}(M) = 0.00 LARGEST H_{m0}(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 5 of 9)

Table C3 (Continued)

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) =225.0
 OCTOBER - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) =247.5
 OCTOBER - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 6 of 9)

Table C3 (Continued)

MD01, OCEAN CITY, MD		38.40N 75.05W		AZIMUTH(DEGREES) =270.0															
				OCTOBER - DECEMBER 1993															
		PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION																	
HEIGHT(METRES)		PEAK PERIOD(SECONDS)																	
SHORTEST-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-		TOTAL								
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER										
0.2-0.4	0								
0.5-0.9	0								
1.0-1.4	0								
1.5-1.9	0								
2.0-2.4	0								
2.5-2.9	0								
3.0-3.4	0								
3.5-3.9	0								
4.0-4.4	0								
4.5-4.9	0								
5.0+	0								
TOTAL	0	0	0	0	0	0	0	0	0	0	0								
MEAN Hm0(M) =	0.00	LARGEST Hm0(M)=	0.0	MEAN TP(SEC)=	0.0	NO. OF CASES=	0.												
MD01, OCEAN CITY, MD		38.40N 75.05W		AZIMUTH(DEGREES) =292.5															
				OCTOBER - DECEMBER 1993															
		PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION																	
HEIGHT(METRES)		PEAK PERIOD(SECONDS)																	
SHORTEST-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-		TOTAL								
4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER										
0.2-0.4	0								
0.5-0.9	0								
1.0-1.4	0								
1.5-1.9	0								
2.0-2.4	0								
2.5-2.9	0								
3.0-3.4	0								
3.5-3.9	0								
4.0-4.4	0								
4.5-4.9	0								
5.0+	0								
TOTAL	0	0	0	0	0	0	0	0	0	0	0								
MEAN Hm0(M) =	0.00	LARGEST Hm0(M)=	0.0	MEAN TP(SEC)=	0.0	NO. OF CASES=	0.												

(Sheet 7 of 9)

Table C3 (Continued)

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) =315.0
OCTOBER - DECEMBER 1993
PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

MD01, OCEAN CITY, MD 38.40N 75.05W AZIMUTH(DEGREES) =337.5
OCTOBER - DECEMBER 1993
PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 8 of 9)

Table C3 (Continued)

MD01, OCEAN CITY, MD 38.40N 75.05W IRRESPECTIVE OF DIRECTION OCTOBER - DECEMBER 1993 PERCENT OCCURRENCE(X100) OF HEIGHT AND PERIOD												
HEIGHT(METRES)	PEAK PERIOD(SECONDS)											TOTAL
	<4.5	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	LONGER	
0.2-0.4	139	96	85	955	161	53	85	21	.	.	1595	
0.5-0.9	279	322	397	1879	537	365	408	182	85	.	4456	
1.0-1.4	21	75	375	580	268	236	279	96	.	.	1930	
1.5-1.9	.	32	397	279	42	85	118	.	.	.	953	
2.0-2.4	.	.	96	375	150	75	85	.	.	.	781	
2.5-2.9	.	.	.	75	32	53	53	.	.	.	213	
3.0-3.4	.	.	.	.	21	21	.	.	.	.	42	
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0	
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0	
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0	
5.0+												0
TOTAL	439	525	1350	4143	1211	888	1028	299	85	0		
COUNT OF Hm0 LESS THAN .2 M=	1.											11.
MEAN Hm0(M)=	1.0	LARGEST Hm0(M)=	3.4	MEAN TP(SEC)=	9.3							TOTAL CASES= 931.

(Sheet 9 of 9)

Table C4
Number of Records for Ocean City, MD (MD02)
October - December 1993

MD02, OCEAN CITY, MD SITE 2 (38.34N 75.07W)

NUMBER OF RECORDS WITH HMO BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	0	0	0	0	0	0	218	265	402	885

NUMBER OF RECORDS WITH HMO AND Tp BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	0	0	0	0	0	0	218	265	402	885

NUMBER OF RECORDS WITH HMO, Tp, AND Dp BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	0	0	0	0	0	0	0	0	0	0

Table C5
Mean/Max Values Ocean City, MD (MD02)
October - December 1993

MEAN H_{m0}(METRES) BY MONTH AND YEAR
 MD02, OCEAN CITY, MD (38.34N 75.07W)

YEAR 1993	MONTH											MEAN 1.0	
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
	1.0	1.2	0.9	

LARGEST H_{m0}(METRES) BY MONTH AND YEAR
 MD02, OCEAN CITY, MD (38.34N 75.07W)

YEAR 1993	MONTH											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	
	3.1	3.3	2.5

1 YR. STATISTICS FOR MD02, OCEAN CITY, MD (38.34N 75.07W)

THE MEAN SIGNIFICANT WAVE HEIGHT(METRES)=	1.0
THE MEAN PEAK WAVE PERIOD (SECONDS)=	8.7
THE STANDARD DEVIATION OF H _{m0} (METRES)=	0.6
THE STANDARD DEVIATION OF TP(SECONDS)=	2.8
THE LARGEST H _{m0} (METRES)=	3.3
THE TP(SECONDS)ASSOC. WITH THE LARGEST H _{m0} =	9.8
THE DATE OF LARGEST H _{m0} OCCURRENCE IS	93112815

Table C6
Percent Occurrence for Ocean City, MD (MD02)
October - December 1993

MD02, OCEAN CITY, MD 38.34N 75.07W IRRESPECTIVE OF DIRECTION OCTOBER - DECEMBER 1993 PERCENT OCCURRENCE(X100) OF HEIGHT AND PERIOD												
HEIGHT(METRES)	PEAK PERIOD(SECONDS)											TOTAL
	<4.5 5.5	4.6- 7.9	5.6- 10.6	8.0- 11.5	10.7- 12.7	11.6- 14.1	12.8- 15.9	14.2- 18.2	16.0- LONGER	18.3-		
0.2-0.4	361	67	180	903	146	112	79	101	22	.	1971	
0.5-0.9	610	463	644	1378	564	338	282	192	11	.	4482	
1.0-1.4	79	101	305	542	158	225	101	79	.	.	1590	
1.5-1.9	22	22	361	124	22	112	67	22	.	.	752	
2.0-2.4	.	11	146	395	112	101	33	.	.	.	798	
2.5-2.9	.	.	.	135	45	79	33	.	.	.	292	
3.0-3.4	.	.	.	33	11	45	.	.	.	.	89	
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0	
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0	
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0	
5.0+	.	.	.	.	.	.	.	.	.	.	0	
TOTAL	1072	664	1636	3510	1058	1012	595	394	33	0	885.	
COUNT OF Hm0 LESS THAN .2 M=	0.											PERCENT(X100) OF Hm0 LESS THAN .2 M= 0.
MEAN Hm0(M)=	1.0	LARGEST Hm0(M)=	3.3	MEAN TP(SEC)=	8.7	TOTAL CASES=	885.					

Appendix D

Wave Data for Virginia Beach, VA

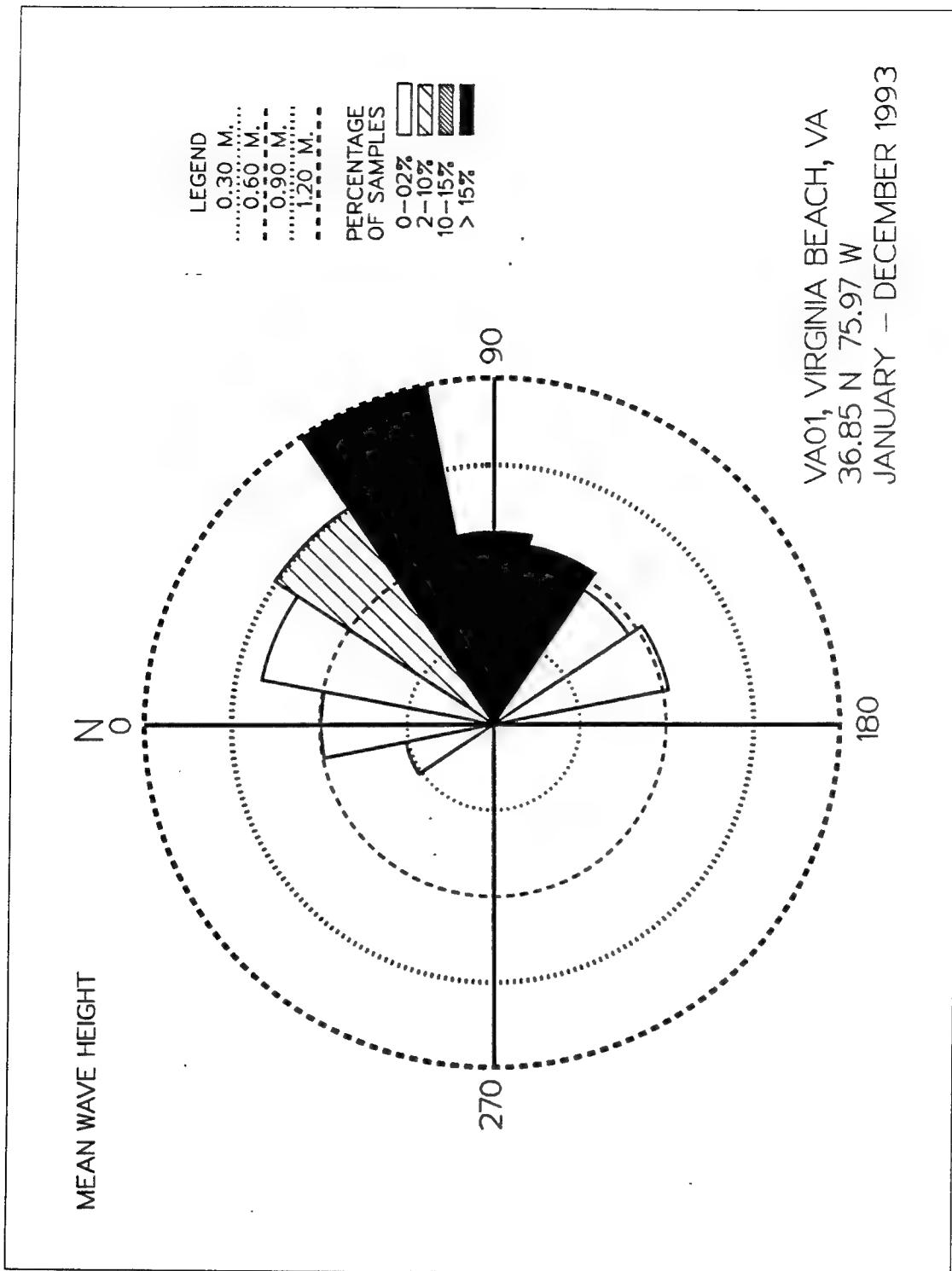


Figure D1. Wave rose, Virginia Beach, VA (VA01)

Table D1
Number of Records for Virginia Beach, VA (VA01)
January - December 1993

VA01, VIRGINIA BEACH, VIRGINIA (36.85N 75.97W)

NUMBER OF RECORDS WITH HMO BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
230	308	303	215	185	172	172	138	190	259	256	219	2647

NUMBER OF RECORDS WITH HMO AND Tp BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
230	308	302	215	185	172	171	138	190	259	254	219	2643

NUMBER OF RECORDS WITH HMO, Tp, AND Dp BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
230	308	302	215	185	172	171	138	190	259	254	219	2643

Table D2
Mean/Max Values Virginia Beach, VA (VA01)
January - December 1993

MEAN H_{m0}(METRES) BY MONTH AND YEAR
 VA01, VIRGINIA BEACH, VA (36.85N 75.97W)

YEAR 1993	MONTH											MEAN 0.8	
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1993	1.0	1.0	0.9	0.9	0.5	0.5	0.4	0.6	0.6	0.9	1.1	1.0	0.8

LARGEST H_{m0}(METRES) BY MONTH AND YEAR
 VA01, VIRGINIA BEACH, VA (36.85N 75.97W)

YEAR 1993	MONTH											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	
1993	2.6	2.6	3.0	2.8	1.0	1.2	1.0	1.8	2.4	2.7	2.8	2.1

1 YR. STATISTICS FOR VA01, VIRGINIA BEACH, VA (36.85N 75.97W)

THE MEAN SIGNIFICANT WAVE HEIGHT(METRES)=	0.8
THE MEAN PEAK WAVE PERIOD (SECONDS)=	8.4
THE MOST FREQUENT 22.5(CENTER) DIRECTION BAND (DEGREES)=	90.0
THE STANDARD DEVIATION OF H _{m0} (METRES)=	0.5
THE STANDARD DEVIATION OF TP(SECONDS)=	2.8
THE LARGEST H _{m0} (METRES)=	3.0
THE TP(SECONDS)ASSOC. WITH THE LARGEST H _{m0} =	12.8
THE PEAK DIRECTION (DEGREES) ASSOC. WITH THE LARGEST H _{m0} =	101.0
THE DATE OF LARGEST H _{m0} OCCURRENCE IS	93031322

Table D3
Percent Occurrence for Virginia Beach, VA (VA01)
January - December 1993

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) = 0.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	189	.	.	.	.	.	.	.	.	.	189
0.5-0.9	340	189	.	.	.	.	.	.	.	.	529
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	529	189	0	0	0	0	0	0	0	0	

MEAN H_mO(M) = 0.59 LARGEST H_mO(M)= 0.8 MEAN TP(SEC)= 4.1 NO. OF CASES= 19.

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) = 22.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	189	.	.	.	.	.	.	.	.	.	189
0.5-0.9	1210	75	.	.	.	.	.	.	.	.	1285
1.0-1.4	113	227	.	.	.	.	.	.	.	.	340
1.5-1.9	.	113	.	.	.	.	.	.	.	.	113
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1512	415	0	0	0	0	0	0	0	0	51.

MEAN H_mO(M) = 0.81 LARGEST H_mO(M)= 1.9 MEAN TP(SEC)= 4.1 NO. OF CASES= 51.

(Sheet 1 of 9)

Table D3 (Continued)

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) = 45.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	605	340	189	.	.	.	.	.	.	.	1134
0.5-0.9	1778	832	302	.	.	.	.	.	.	.	2912
1.0-1.4	605	718	340	.	.	.	.	.	.	.	1663
1.5-1.9	.	75	416	37	.	37	.	.	.	.	565
2.0-2.4	.	.	113	.	.	.	.	.	.	.	113
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	2988	1965	1360	37	0	37	0	0	0	0	169.

MEAN Hm0(M) = 0.91 LARGEST Hm0(M)= 2.3 MEAN TP(SEC)= 4.8 NO. OF CASES= 169.

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) = 67.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	416	416	870	529	529	340	454	113	37	75	3779
0.5-0.9	1021	1097	2345	1286	1135	491	340	189	.	37	7941
1.0-1.4	.	1248	2194	1097	605	794	567	416	37	.	6958
1.5-1.9	.	378	3291	1059	605	454	75	113	.	.	5975
2.0-2.4	.	.	908	1513	151	113	.	.	.	.	2685
2.5-2.9	.	.	75	227	.	37	.	.	.	.	339
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1437	3139	9683	5711	3025	2229	1436	831	74	112	732.

MEAN Hm0(M) = 1.20 LARGEST Hm0(M)= 2.7 MEAN TP(SEC)= 8.2 NO. OF CASES= 732.

(Sheet 2 of 9)

Table D3 (Continued)

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) = 90.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	302	113	2043	11048	2421	1626	983	681	378	37	19632
0.5-0.9	718	983	1778	7340	1702	1362	1286	983	37	.	16189
1.0-1.4	151	75	605	1437	567	416	189	151	151	.	3742
1.5-1.9	.	37	416	605	189	189	75	75	.	.	1586
2.0-2.4	.	.	75	264	113	37	.	.	.	.	489
2.5-2.9	.	.	.	264	75	.	37	113	.	.	489
3.0-3.4	.	.	.	.	.	.	37	.	.	.	37
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1171	1208	4917	20958	5067	3630	2607	2003	566	37	

MEAN Hm0(M) = 0.67 LARGEST Hm0(M)= 3.0 MEAN TP(SEC)= 9.5 NO. OF CASES= 1115.

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =112.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	416	189	1891	5864	378	113	189	302	113	.	9455
0.5-0.9	529	756	2421	2913	378	227	302	37	37	.	7600
1.0-1.4	.	302	227	37	75	151	75	75	.	.	942
1.5-1.9	.	.	189	189	37	37	.	.	.	.	452
2.0-2.4	.	.	37	113	.	113	.	.	.	.	263
2.5-2.9	.	.	75	113	75	113	.	.	.	.	376
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	945	945	4614	9305	1208	527	905	414	225	0	

MEAN Hm0(M) = 0.64 LARGEST Hm0(M)= 2.8 MEAN TP(SEC)= 8.5 NO. OF CASES= 505.

(Sheet 3 of 9)

Table D3 (Continued)

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =135.0
 JANUARY - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	416	113	113	75	.	.	.	.	.	.	717
0.5-0.9	681	227	189	.	.	.	.	.	.	.	1097
1.0-1.4	37	.	.	.	.	.	.	.	.	.	37
1.5-1.9	37	.	.	.	.	.	.	.	.	.	37
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1171	340	302	75	0	0	0	0	0	0	50.

MEAN Hm0(M) = 0.57 LARGEST Hm0(M)= 1.5 MEAN TP(SEC)= 4.7 NO. OF CASES= 50.

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =157.5
 JANUARY - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	0
0.5-0.9	37	.	.	.	.	.	.	.	.	.	37
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	.	37	0	0	0	0	0	0	0	0	1.

MEAN Hm0(M) = 0.62 LARGEST Hm0(M)= 0.6 MEAN TP(SEC)= 4.0 NO. OF CASES= 1.

(Sheet 4 of 9)

Table D3 (Continued)

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =180.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =202.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 5 of 9)

Table D3 (Continued)

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =225.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

VAD1, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =247.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 6 of 9)

Table D3 (Continued)

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =270.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =292.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 7 of 9)

Table D3 (Continued)

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =315.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

VA01, VIRGINIA BEACH, VA 36.85N 75.97W AZIMUTH(DEGREES) =337.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	37	.	.	.	.	.	.	.	.	.	37
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	37	0	0	0	0	0	0	0	0	0	1.

MEAN Hm0(M) = 0.31 LARGEST Hm0(M)= 0.3 MEAN TP(SEC)= 3.9 NO. OF CASES= 1.

(Sheet 8 of 9)

Table D3 (Continued)

VA01, VIRGINIA BEACH, VA		36.85N 75.97W IRRESPECTIVE OF DIRECTION JANUARY - DECEMBER 1993 PERCENT OCCURRENCE(X100) OF HEIGHT AND PERIOD											
HEIGHT(NETRES)		PEAK PERIOD(SECONDS)											TOTAL
		<4.5	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	LONGER	
		5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2				
0.2-0.4	256	117	510	1749	332	207	162	109	52	11	3505		
0.5-0.9	630	415	702	1152	321	207	192	120	7	3	3749		
1.0-1.4	90	226	343	275	120	128	90	64	26	.	1362		
1.5-1.9	3	60	411	188	98	71	38	18	.	.	867		
2.0-2.4	.	.	109	181	37	15	11	.	.	.	353		
2.5-2.9	.	.	7	56	18	11	15	11	.	.	118		
3.0-3.4	.	.	.	.	.	.	3	.	.	.	3		
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0		
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0		
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0		
5.0+	.	.	.	.	.	.	.	.	.	.	0		
TOTAL	979	818	2082	3601	926	639	491	322	85	14			
COUNT OF Hm0 LESS THAN .2 M=	4.										15.		
MEAN Hm0(M)=	0.8	LARGEST Hm0(M)=	3.0	MEAN TP(SEC)=	8.4	TOTAL CASES=	2647.						

(Sheet 9 of 9)

Appendix E

Wave Data for Sarasota, FL

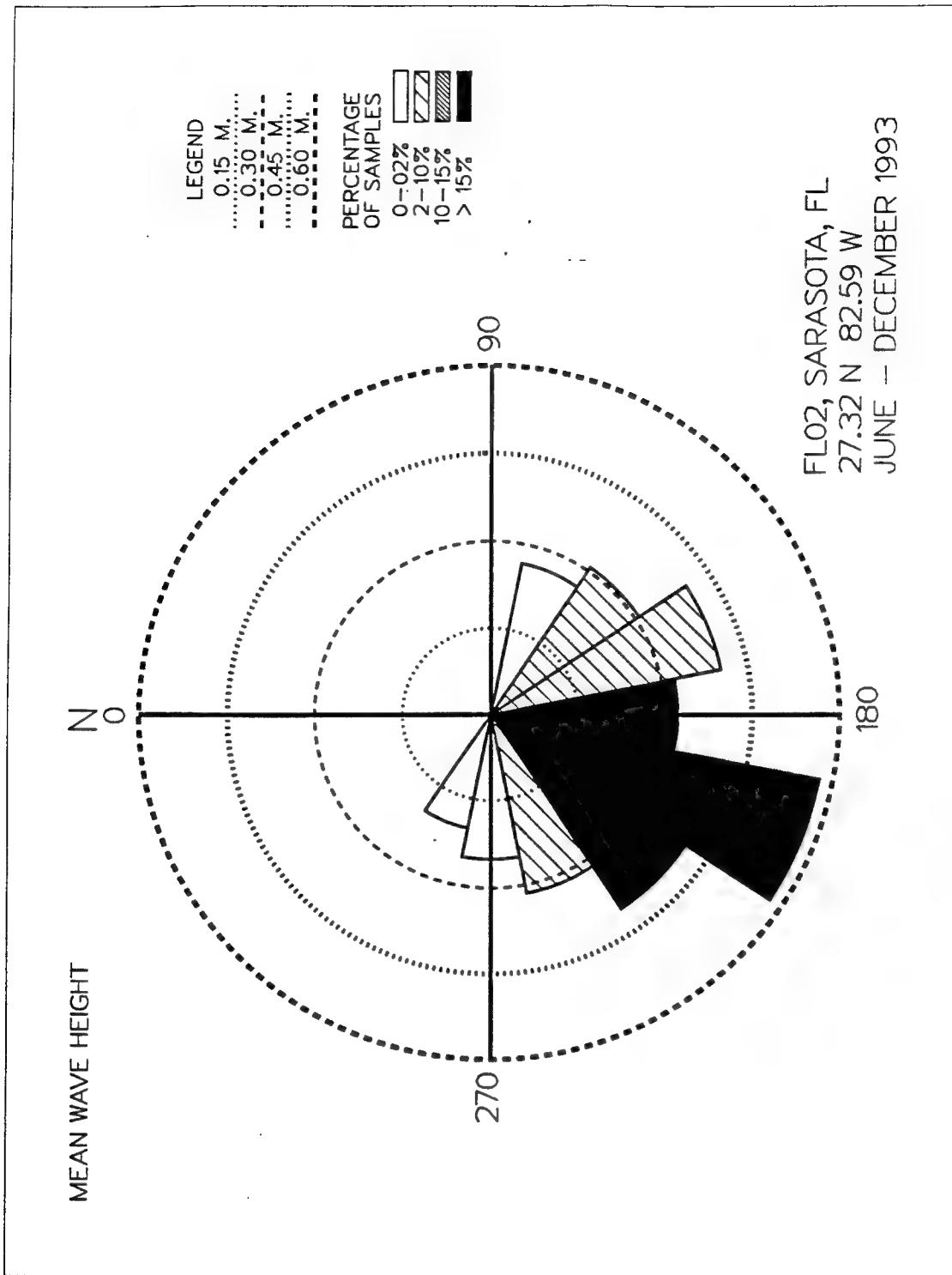


Figure E1. Wave rose, Sarasota, FL (FL02)

Table E1
Number of Records for Sarasota, FL (FL02)
June - December 1993

FL02, SARASOTA, FL (27.30N 82.59)

(27.30N 82.59)

NUMBER OF RECORDS WITH HMO BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	0	0	216	144	171	174	181	690	343	1919

NUMBER OF RECORDS WITH HMO AND TP BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	0	0	68	49	86	88	73	461	194	1019

NUMBER OF RECORDS WITH M/MO, T/D, AND D/D BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
0	0	0	0	0	68	49	85	88	73	461	194	1018

Table E2
Mean/Max Values Sarasota, FL (FL02)
June - December 1993

MEAN H_{m0}(METRES) BY MONTH AND YEAR
 FL02, SARASOTA, FL (27.30N 82.59)

YEAR 1993	MONTH											MEAN 0.4	
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
.	0.3	0.3	0.4	0.3	0.5	0.3	0.6	.	

LARGEST H_{m0}(METRES) BY MONTH AND YEAR
 FL02, SARASOTA, FL (27.30N 82.59)

YEAR 1993	MONTH												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
.	0.5	0.6	0.6	0.4	1.8	1.4	1.5	

1 YR. STATISTICS FOR FL02, SARASOTA, FL (27.30N 82.59)

THE MEAN SIGNIFICANT WAVE HEIGHT(METRES)=	0.4
THE MEAN PEAK WAVE PERIOD (SECONDS)=	5.9
THE MOST FREQUENT 22.5(CENTER) DIRECTION BAND (DEGREES)=	225.0
THE STANDARD DEVIATION OF H _{m0} (METRES)=	0.3
THE STANDARD DEVIATION OF TP(SECONDS)=	1.4
THE LARGEST H _{m0} (METRES)=	1.8
THE TP(SECONDS)ASSOC. WITH THE LARGEST H _{m0} =	7.5
THE PEAK DIRECTION (DEGREES) ASSOC. WITH THE LARGEST H _{m0} =	165.0
THE DATE OF LARGEST H _{m0} OCCURRENCE IS	93103020

Table E3
Percent Occurrence for Sarasota, FL (FL02)
June - December 1993

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) = 0.0
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	.	.	.	.	.	.	.	.	.	.	0
0.5-0.9	.	.	.	.	.	.	.	.	.	.	0
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.											

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) = 22.5
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	.	.	.	.	.	.	.	.	.	.	0
0.5-0.9	.	.	.	.	.	.	.	.	.	.	0
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.											

(Sheet 1 of 9)

Table E3 (Continued)

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) = 45.0
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.											

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) = 67.5
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.											

(Sheet 2 of 9)

Table E3 (Continued)

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) = 90.0
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =112.5
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	294	.	.	.	.	.	.	.	.	.	294
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	294	0	0	0	0	0	0	0	0	0	3.

(Sheet 3 of 9)

Table E3 (Continued)

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =135.0
 JUNE - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	3634	1669	.	.	.	.	.	.	.	.	5303
0.5-0.9	196	196	.	.	.	.	.	.	.	.	392
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	3830	1865	0	0	0	0	0	0	0	0	58.

MEAN Hm0(M) = 0.31 LARGEST Hm0(M)= 0.9 MEAN TP(SEC)= 4.3 NO. OF CASES= 58.

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =157.5
 JUNE - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	1669	785	2357	1178	.	.	.	.	.	.	5989
0.5-0.9	.	589	491	98	.	.	.	.	.	.	1178
1.0-1.4	.	.	96	98	.	.	.	.	.	.	196
1.5-1.9	.	.	294	.	.	.	.	.	.	.	294
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	1669	1374	3240	1374	0	0	0	0	0	0	78.

MEAN Hm0(M) = 0.40 LARGEST Hm0(M)= 1.8 MEAN TP(SEC)= 6.1 NO. OF CASES= 78.

(Sheet 4 of 9)

Table E3 (Continued)

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =180.0
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	2652	392	11493	4027	.	.	.	.	.	.	18564
0.5-0.9	.	1080	294	98	.	.	.	.	.	.	1472
1.0-1.4	.	.	392	196	.	.	.	.	.	.	588
1.5-1.9	.	.	.	98	.	.	.	.	.	.	98
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	2652	1472	12179	4419	0	0	0	0	0	0	211.

MEAN Hm0(M) = 0.32 LARGEST Hm0(M)= 1.6 MEAN TP(SEC)= 6.6 NO. OF CASES= 211.

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =202.5
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	LONGER	
0.2-0.4	1178	1571	6581	785	.	.	.	.	.	.	10115
0.5-0.9	491	98	3634	2655	.	.	.	.	.	.	6678
1.0-1.4	.	98	491	1866	.	.	.	.	.	.	2455
1.5-1.9	.	.	196	98	98	.	.	.	.	.	392
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1669	1767	10902	5204	98	0	0	0	0	0	200.

MEAN Hm0(M) = 0.58 LARGEST Hm0(M)= 1.7 MEAN TP(SEC)= 6.9 NO. OF CASES= 200.

(Sheet 5 of 9)

Table E3 (Continued)

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =225.0
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	4125	8349	16011	98	.	.	.	.	.	.	28583
0.5-0.9	491	1768	5402	196	.	.	.	.	.	.	7857
1.0-1.4	.	.	196	98	.	.	.	.	.	.	294
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	4616	10117	21609	392	0	0	0	0	0	0	374.

MEAN Hm0(M) = 0.41 LARGEST Hm0(M)= 1.2 MEAN TP(SEC)= 5.6 NO. OF CASES= 374.

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =247.5
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	3929	3438	785	.	.	.	.	.	.	.	8152
0.5-0.9	491	196	.	.	.	.	.	.	.	.	687
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	4420	3634	785	0	0	0	0	0	0	0	90.

MEAN Hm0(M) = 0.31 LARGEST Hm0(M)= 0.7 MEAN TP(SEC)= 4.5 NO. OF CASES= 90.

(Sheet 6 of 9)

Table E3 (Continued)

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =270.0
 JUNE - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	294	.	.	.	.	.	.	.	.	.	294
0.5-0.9	.	.	.	.	.	.	.	.	.	.	0
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	294	0	0	0	0	0	0	0	0	0	
MEAN Hm0(M) = 0.25 LARGEST Hm0(M)= 0.3 MEAN TP(SEC)= 3.9 NO. OF CASES=											3.

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =292.5
 JUNE - DECEMBER 1993

PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	98	.	.	.	.	.	.	.	.	.	98
0.5-0.9	.	.	.	.	.	.	.	.	.	.	0
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	98	0	0	0	0	0	0	0	0	0	
MEAN Hm0(M) = 0.20 LARGEST Hm0(M)= 0.2 MEAN TP(SEC)= 3.9 NO. OF CASES=											1.

(Sheet 7 of 9)

Table E3 (Continued)

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =315.0
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.
MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.											

FL02, SARASOTA, FL 27.30N 82.59 AZIMUTH(DEGREES) =337.5
 JUNE - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.
MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.											

(Sheet 8 of 9)

Table E3 (Continued)

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL		
	<4.5		4.6-		5.6-		8.0-		10.7-				
	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER				
0.2-0.4	953	859	1974	323	.	.	.	.	.	.	4109
0.5-0.9	88	208	521	151	.	.	.	.	.	.	968
1.0-1.4	.	5	62	119	.	.	.	.	.	.	186
1.5-1.9	.	.	26	10	5	.	.	.	.	.	41
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1041	1072	2583	603	5	0	0	0	0	0			

COUNT OF Hm0 LESS THAN .2 M= 900. PERCENT(X100) OF Hm0 LESS THAN .2 M= 4690.

MEAN Hm0(M)= 0.2 LARGEST Hm0(M)= 1.8 MEAN TP(SEC)= 3.2 TOTAL CASES= 1919.

(Sheet 9 of 9)

Appendix F

Wave Data for Chicago, IL

F1

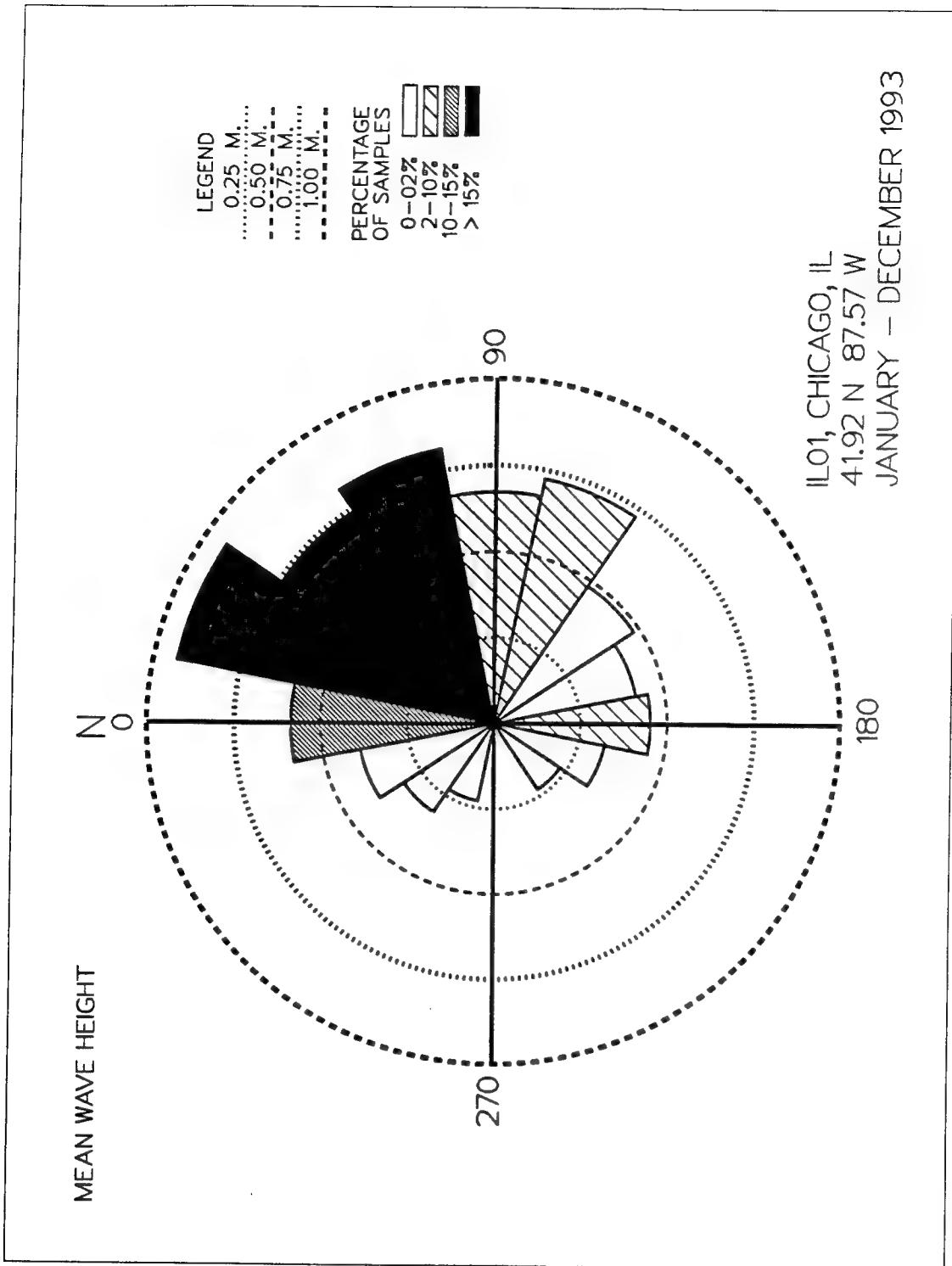


Figure F1. Wave rose, Chicago, IL (IL01)

Table F1
Number of Records for Chicago, IL (IL01)
January - December 1993

IL01, CHICAGO, ILLINOIS (41.92N 87.57W)

(41.92N 87.57W)

NUMBER OF RECORDS WITH HMO BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
205	159	166	237	210	201	175	184	176	250	208	208	2379

NUMBER OF RECORDS WITH HMO AND TP BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
126	91	107	167	68	64	54	47	101	133	122	141	1221

NUMBER OF RECORDS WITH MMQ, TB, AND DD BY MONTH FOR 1993

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
126	91	107	167	68	64	54	47	101	133	122	141	1221

Table F2
Mean/Max Values for Chicago, IL (IL01)
January - December 1993

MEAN H _{m0} (METRES) BY MONTH AND YEAR IL01, CHICAGO, IL (41.92N 87.57W)												
MONTH												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
YEAR 1993	0.9	0.8	0.8	1.0	0.9	0.6	0.4	0.4	0.5	0.8	0.8	0.6
MEAN												
	0.8											
LARGEST H _{m0} (METRES) BY MONTH AND YEAR IL01, CHICAGO, IL (41.92N 87.57W)												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
YEAR 1993	2.0	1.7	2.2	2.4	2.4	1.7	0.8	1.4	1.4	1.8	1.5	1.8
1 YR. STATISTICS FOR IL01, CHICAGO, IL (41.92N 87.57W)												
THE MEAN SIGNIFICANT WAVE HEIGHT(METRES)=												0.8
THE MEAN PEAK WAVE PERIOD (SECONDS)=												5.6
THE MOST FREQUENT 22.5(CENTER) DIRECTION BAND (DEGREES)=												22.5
THE STANDARD DEVIATION OF H _{m0} (METRES)=												0.5
THE STANDARD DEVIATION OF TP(SECONDS)=												1.5
THE LARGEST H _{m0} (METRES)=												2.4
THE TP(SECONDS)ASSOC. WITH THE LARGEST H _{m0} =												8.5
THE PEAK DIRECTION (DEGREES) ASSOC. WITH THE LARGEST H _{m0} =												28.0
THE DATE OF LARGEST H _{m0} OCCURRENCE IS												93051306

Table F3
Percent Occurrence for Chicago, IL (IL01)
January - December 1993

IL01, CHICAGO, IL		41.92N 87.57W AZIMUTH(DEGREES) = 0.0										
		JANUARY - DECEMBER 1993										
		PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION										
HEIGHT(METRES)		PEAK PERIOD(SECONDS)										TOTAL
SHORTEST-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-			LONGER
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2			
0.2-0.4	3931	1064	900	.	.	.	.	.	.	.	.	5895
0.5-0.9	1392	900	1965	.	.	.	.	.	.	.	.	4257
1.0-1.4	327	409	245	.	.	.	.	.	.	.	.	981
1.5-1.9	.	81	327	.	.	.	.	.	.	.	.	408
2.0-2.4	.	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	.	0
TOTAL	5650	2454	3437	0	0	0	0	0	0	0	0	141.
MEAN Hm0(M) = 0.59 LARGEST Hm0(M)= 1.8 MEAN TP(SEC)= 4.8 NO. OF CASES=												

IL01, CHICAGO, IL		41.92N 87.57W AZIMUTH(DEGREES) = 22.5										
		JANUARY - DECEMBER 1993										
		PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION										
HEIGHT(METRES)		PEAK PERIOD(SECONDS)										TOTAL
SHORTEST-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-			LONGER
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2			
0.2-0.4	4013	2538	2129	.	.	.	.	.	.	.	.	8680
0.5-0.9	900	1965	6470	655	.	.	.	.	.	.	.	9990
1.0-1.4	81	327	4095	982	.	.	.	.	.	.	.	5485
1.5-1.9	.	2538	1064	.	.	.	.	.	.	.	.	3602
2.0-2.4	.	.	245	1556	245	.	.	.	.	.	.	2046
2.5-2.9	.	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	.	0
TOTAL	4994	4830	15477	4257	245	0	0	0	0	0	0	364.
MEAN Hm0(M) = 0.93 LARGEST Hm0(M)= 2.4 MEAN TP(SEC)= 6.3 NO. OF CASES=												

(Sheet 1 of 9)

Table F3 (Continued)

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) = 45.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	4013	3276	1801	.	.	.	.	.	.	.	9090
0.5-0.9	1556	3276	2866	.	.	.	.	.	.	.	7698
1.0-1.4	245	1556	1474	409	.	.	.	.	.	.	3684
1.5-1.9	.	81	2129	245	.	.	.	.	.	.	2455
2.0-2.4	.	.	.	163	.	.	.	.	.	.	163
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	5814	8189	8270	817	0	0	0	0	0	0	

MEAN Hm0(M) = 0.74 LARGEST Hm0(M)= 2.1 MEAN TP(SEC)= 5.3 NO. OF CASES= 282.

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) = 67.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	1883	1474	1883	.	.	.	.	.	.	.	5240
0.5-0.9	655	1228	6633	327	.	.	.	.	.	.	8843
1.0-1.4	.	81	3112	1965	.	.	.	.	.	.	5158
1.5-1.9	.	.	900	491	.	.	.	.	.	.	1391
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	2538	2783	12528	2783	0	0	0	0	0	0	

MEAN Hm0(M) = 0.81 LARGEST Hm0(M)= 1.8 MEAN TP(SEC)= 6.2 NO. OF CASES= 252.

(Sheet 2 of 9)

Table F3 (Continued)

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) = 90.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	1474	163	81	81	.	.	.	.	.	.	1799
0.5-0.9	409	655	327	.	.	.	.	.	.	.	1391
1.0-1.4	.	163	491	81	.	.	.	.	.	.	735
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1883	981	899	162	0	0	0	0	0	0	48.

MEAN Hm0(M) = 0.67 LARGEST Hm0(M)= 1.5 MEAN TP(SEC)= 4.9 NO. OF CASES= 48.

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =112.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	737	.	.	.	.	.	.	.	.	.	737
0.5-0.9	737	327	.	.	.	.	.	.	.	.	1064
1.0-1.4	.	163	81	.	.	.	.	.	.	.	244
1.5-1.9	.	81	81	.	.	.	.	.	.	.	162
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1474	571	162	0	0	0	0	0	0	0	27.

MEAN Hm0(M) = 0.72 LARGEST Hm0(M)= 1.7 MEAN TP(SEC)= 4.4 NO. OF CASES= 27.

(Sheet 3 of 9)

Table F3 (Continued)

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =135.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	982	.	.	.	.	.	.	.	.	.	982
0.5-0.9	573	.	.	.	.	.	.	.	.	.	573
1.0-1.4	81	.	.	.	.	.	.	.	.	.	81
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1636	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.48 LARGEST Hm0(M)= 1.4 MEAN TP(SEC)= 3.9 NO. OF CASES= 20.

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =157.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	1064	.	.	.	.	.	.	.	.	.	1064
0.5-0.9	491	.	.	.	.	.	.	.	.	.	491
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1555	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.42 LARGEST Hm0(M)= 0.9 MEAN TP(SEC)= 3.8 NO. OF CASES= 19.

(Sheet 4 of 9)

Table F3 (Continued)

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =180.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	1638	.	.	.	.	.	.	.	.	.	1638
0.5-0.9	819	163	.	.	.	.	.	.	.	.	982
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	2457	163	0	0	0	0	0	0	0	0	

MEAN Hm0(M) = 0.45 LARGEST Hm0(M)= 0.9 MEAN TP(SEC)= 3.9 NO. OF CASES= 32.

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =202.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	1310	.	.	.	.	.	.	.	.	.	1310
0.5-0.9	245	.	.	.	.	.	.	.	.	.	245
1.0-1.4	.	.	.	.	.	.	.	.	.	.	0
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1555	0	0	0	0	0	0	0	0	0	

MEAN Hm0(M) = 0.33 LARGEST Hm0(M)= 0.7 MEAN TP(SEC)= 3.8 NO. OF CASES= 19.

(Sheet 5 of 9)

Table F3 (Continued)

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =225.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	81	.	.	.	.	.	.	.	.	.	81
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	81	0	0	0	0	0	0	0	0	0	1.

MEAN Hm0(M) = 0.23 LARGEST Hm0(M)= 0.2 MEAN TP(SEC)= 3.8 NO. OF CASES= 1.

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =247.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0.

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

(Sheet 6 of 9)

Table F3 (Continued)

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =270.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	0
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

MEAN Hm0(M) = 0.00 LARGEST Hm0(M)= 0.0 MEAN TP(SEC)= 0.0 NO. OF CASES= 0.

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =292.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER-	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	4.5	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2	LONGER	
0.2-0.4	81	.	.	.	.	.	.	.	.	.	81
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	81	0	0	0	0	0	0	0	0	0	1.

MEAN Hm0(M) = 0.23 LARGEST Hm0(M)= 0.2 MEAN TP(SEC)= 3.9 NO. OF CASES= 1.

(Sheet 7 of 9)

Table F3 (Continued)

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =315.0
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	163	.	.	.	.	.	.	.	.	.	163
0.5-0.9	0
1.0-1.4	0
1.5-1.9	0
2.0-2.4	0
2.5-2.9	0
3.0-3.4	0
3.5-3.9	0
4.0-4.4	0
4.5-4.9	0
5.0+	0
TOTAL	163	0	0	0	0	0	0	0	0	0	

MEAN Hm0(M) = 0.31 LARGEST Hm0(M)= 0.4 MEAN TP(SEC)= 3.7 NO. OF CASES= 2.

IL01, CHICAGO, IL 41.92N 87.57W AZIMUTH(DEGREES) =337.5
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X1000) OF HEIGHT AND PERIOD BY DIRECTION

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	SHORTER- 4.5	4.6- 5.5	5.6- 7.9	8.0- 10.6	10.7- 11.5	11.6- 12.7	12.8- 14.1	14.2- 15.9	16.0- 18.2	18.3- LONGER	
0.2-0.4	573	163	81	.	.	.	.	.	.	.	817
0.5-0.9	163	.	.	.	.	.	.	.	.	.	163
1.0-1.4	81	.	.	.	.	.	.	.	.	.	81
1.5-1.9	.	.	.	.	.	.	.	.	.	.	0
2.0-2.4	.	.	.	.	.	.	.	.	.	.	0
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	817	163	81	0	0	0	0	0	0	0	

MEAN Hm0(M) = 0.39 LARGEST Hm0(M)= 1.0 MEAN TP(SEC)= 4.3 NO. OF CASES= 13.

(Sheet 8 of 9)

Table F3 (Continued)

IL01, CHICAGO, IL 41.92N 87.57W IRRESPECTIVE OF DIRECTION
 JANUARY - DECEMBER 1993
 PERCENT OCCURRENCE(X100) OF HEIGHT AND PERIOD

HEIGHT(METRES)	PEAK PERIOD(SECONDS)										TOTAL
	<4.5	4.6-	5.6-	8.0-	10.7-	11.6-	12.8-	14.2-	16.0-	18.3-	
	5.5	7.9	10.6	11.5	12.7	14.1	15.9	18.2			
0.2-0.4	1126	445	353	4	.	.	.	.	.	.	1928
0.5-0.9	407	437	937	50	.	.	.	.	.	.	1831
1.0-1.4	42	138	487	176	.	.	.	.	.	.	843
1.5-1.9	.	12	306	92	.	.	.	.	.	.	410
2.0-2.4	.	.	12	88	12	.	.	.	.	.	112
2.5-2.9	.	.	.	.	.	.	.	.	.	.	0
3.0-3.4	.	.	.	.	.	.	.	.	.	.	0
3.5-3.9	.	.	.	.	.	.	.	.	.	.	0
4.0-4.4	.	.	.	.	.	.	.	.	.	.	0
4.5-4.9	.	.	.	.	.	.	.	.	.	.	0
5.0+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	1575	1032	2095	410	12	0	0	0	0	0	

COUNT OF Hm0 LESS THAN .2 M= 1158. PERCENT(X100) OF Hm0 LESS THAN .2 M= 4868.

MEAN Hm0(N)= 0.4 LARGEST Hm0(M)= 2.4 MEAN TP(SEC)= 2.9 TOTAL CASES= 2379.

(Sheet 9 of 9)

REPORT DOCUMENTATION PAGE

*Form Approved
OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)			2. REPORT DATE September 1995			3. REPORT TYPE AND DATES COVERED Final report		
4. TITLE AND SUBTITLE 1993 Annual Climatic Summary for the Network for Engineering Monitoring of the Ocean						5. FUNDING NUMBERS		
6. AUTHOR(S) Margaret A. Sabol, David D. McGehee								
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Engineer Waterways Experiment Station 3909 Halls Ferry Road, Vicksburg, MS 39180-6199						8. PERFORMING ORGANIZATION REPORT NUMBER Miscellaneous Paper CERC-95-7		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)						10. SPONSORING/MONITORING AGENCY REPORT NUMBER		
11. SUPPLEMENTARY NOTES Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.								
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					12b. DISTRIBUTION CODE			
13. ABSTRACT (Maximum 200 words) <p>This report contains summary information for seven wave gages in operation in 1993 along the U.S. coasts. Five of the gages are located along the U.S. Atlantic coast, one in Lake Michigan, and one is located in the eastern Gulf of Mexico. These gages are part of the Network for Engineering Monitoring of the Oceans (NEMO) operated by the Prototype Measurement and Analysis Branch of the Coastal Engineering Research Center, U.S. Army Engineer Waterways Experiment Station. The wave data summary products presented in this report are provided to aid in engineering design, assessment, operation, and maintenance of Corps coastal projects. Future summaries will be a product of the Field Wave Gaging Program.</p>								
14. SUBJECT TERMS Climate Wave gages Statistics Waves Wave data					15. NUMBER OF PAGES 99		16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED		18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED		19. SECURITY CLASSIFICATION OF ABSTRACT		20. LIMITATION OF ABSTRACT		